

THE FAILURE OF GERMAN LOGISTICS DURING THE
ARDENNES OFFENSIVE OF 1944

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ABSTRACT

THE FAILURE OF GERMAN LOGISTICS DURING THE GERMAN ARDENNES OFFENSIVE OF 1944 by MAJ James L. Kennedy, Jr., USA, 121 pages.

This study investigates the role that logistics played in the failure of the German Offensive in the Ardennes in 1944. The thesis explains that despite the incredible buildup of forces and supplies, the inability of the German strategic and operational logistics systems to properly equip, fuel, arm, and move forces caused the failure of the Ardennes Offensive.

The concept of this thesis starts with the overall strategic military and political situation of Germany in the fall of 1944 that Hitler used to base his decision to conduct the offensive in December 1944.

The study then examines in detail the strategic capabilities during the buildup of supplies and the operational level organization and planning for the offensive. An analysis of the details on the impact of terrain, climate, allied air interdiction, and Operation Point Blank is included in this chapter.

Then it examines the first weeks of the offensive and looks at the failure of the fuel and arm and move tactical logistics functions. An analysis of the impact of logistics on supporting operations is included in this chapter.

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CHAPTER 1

OVERVIEW OF THE GERMAN STRATEGIC SITUATION

On 16 December 1944, Hitler launched a massive attack through the Ardennes with three armies and twenty-five divisions. This attack quickly stalled and failed to meet any of the objectives set forth for success. Historians have cited many reasons for the failure of the offensive: a staunch defense by American individuals and units, Lieutenant General George Patton's rapid northward movement of the Third US Army to attack the southern flank of the German forces, Allied airpower, weather and terrain, and Allied leadership. However, the foundation of the failure started months before the 16 December surprise attack. Since that fateful day, historians have tended to overshadow the critical role of logistics in influencing the outcome of one of World War Two's greatest battles. The intent of this thesis is to show the critical and decisive role that the failures in German logistics played in their defeat in the Ardennes. This thesis will illustrate that the failure of the German strategic and operational logistics system to properly equip, arm, fuel, and move German forces had the most direct influence on the failure of the 1944 Ardennes Offensive.

Section I. German Military and Political Situation

By the fall of 1944, Hitler's five-year military grip on Europe was in a significantly different situation that it was at the beginning of the year. Since the start of the year, Germany had suffered many military defeats and political setbacks. On the Western Front, the Americans and British armies had landed in June at Normandy and established a beachhead in "Fortress Europe." Meanwhile, Rome fell to the Allies and the Germans had fallen back to the Gothic Line in Italy. By the end of July the

Americans had broken through at Avaranches and throughout August, Germans were retreating across France toward Germany. Allied forces all but destroyed the best German units on the Western Front in the Falaise Pocket. Also in July, German industrial production began to decline as a result of the Allied strategic bombing campaign. In August, the Allies had invaded Southern France and were rapidly advancing up the Rhone Valley. Additionally, over 230,000 Germans were surrounded in the West.¹ These forces were mainly located in the ports of coastal France and either surrendered or were captured by the end of the year. Paris fell on 25 August, and the northern and southern elements of the Allied forces in France were rapidly advancing to link-up at Dijon, France. In September, American troops had entered German territory south of Aachen. Total losses by the Germans in France (excluding Southern France where losses were light) from 6 June to 11 September were 224,000 killed, captured, wounded, or missing--an amount equal to one-half the German casualties in the west.² In force strength, the Americans and British totaled ninety-six divisions along the Western Front opposed by fifty-five German divisions.³ To compare the size of forces, American, British, and German infantry divisions were all organized with approximately 17,000 soldiers. Armored divisions varied slightly between countries with the British outmanning the others by approximately 3,000 soldiers.⁴ Despite the similar organizations, the Allied divisions were in a much better state of readiness than the German divisions. German infantry and armored divisions, disorganized during the retreat, were in various states of readiness.

On the Eastern Front, the situation was even worse. The Soviet summer offensive had run its course by the end of July and the results were devastating for Germany.

Operation Bagration decimated two German Armies--forcing one-third of the German forces to retreat and causing the loss of over 350,000 German troops and 900 tanks.⁵ The Soviets had pushed German troops out of Russia and established footholds near Warsaw, the Vistula, and on the Baltic Sea. In August, the Soviets occupied Rumania where the valuable Ploesti oil fields were located. In September, the Soviets had 555 division-sized units attacking Germans along the entire Eastern Front.⁶ While 555 divisions seems significant when compared to the number of divisions the Americans and British had on the Western Front, a comparison shows a Soviet division equivalent unit had approximately 4,000 to 5,000 troops.⁷ Finally, two armies of the German Army Group Ukraine were trapped and virtually destroyed in Rumania. In Finland, nine German divisions were unable to depart Finland and return to Germany and could only remain and guard the Petsamo nickel mines from capture by Russia.⁸ In contrast to the Western Front, Stalin halted his strategic bombing of Germany's war production in July. Stalin had two reasons for this decision. First, he was anticipating a confrontation with America and Britain after Germany's defeat and would need a mobilized and militarized Germany as an ally. Secondly, he was concerned with the cost of rebuilding Germany after the war.⁹

In contrast to the overall military situation, Germany's manpower was in a better condition. From 1938 through 1943, the Wehrmacht mobilized over eleven million men. Losses for the same period totaled over six million killed, captured, wounded, or missing.¹⁰ Specifically, Hitler was concerned with the recent losses between June and August 1944 of over one million soldiers killed, wounded, missing, or captured.¹¹ Although Germany's population was considerably militarized, significant military

manpower was still available by the fall of 1944. The available manpower was spread over several sources of personnel. For example, despite using women in some roles, Germany never mobilized women in any meaningful amount. There were about two and one-half-million workers clearing bombed facilities and other areas of debris from Allied bombing. Meanwhile, over three and one-half-million public administrators and one-half-million men were deferred for occupational reasons. These personnel resources amounted to an impressive reserve available for mobilization to support the war effort. Furthermore, Germany was using approximately seven million foreign workers and prisoners of war in many aspects of war production and civilian industry.¹²

In September 1944, Germany's military totaled 327 divisions and separate brigades including thirty-one armored divisions and armored separate brigades spread over both fronts. While this is an impressive number of divisions, many of these units did not exist but were still on the official records. Other units were so decimated they were essentially combat ineffective. The total manpower was over ten million officers and men in the Wehrmacht at the beginning of September.¹³

Despite the large number of divisions reported, the low strength of troops in these units concerned Hitler. To resolve the personnel readiness problems, Hitler appointed Heinrich Himmler as Chief of the Replacement Army. Himmler developed programs to purge staff offices, consolidate combat ineffective units, and transfer troops from the Luftwaffe and Navy. Some other measures Himmler implemented were activating soldiers who were deferred for medical reasons and placing them in special units to man the Siegfried Line. He also took these newly activated soldiers and used them in jobs that were not directly combat related to allow able combat troops to be sent to front line units.

Finally, the age limit for volunteers dropped from age eighteen to age sixteen while the oldest age increased from fifty-eight to sixty. To promote party unity and make the plan acceptable to the public, Reich Minister Joseph Goebbels announced new mobilization measures. Goebbels closed schools and theaters, increased the work week from forty to sixty hours, temporarily abolished holidays, closed small shops of many types, and denuded the staffs of government bureaus. All of these measures enabled Himmler to create eighteen new divisions, ten separate brigades and nearly one-hundred separate battalions.¹⁴ These new units were fielded to fronts as necessary. The low manpower situation in divisions was upgraded by taking soldiers from low-strength divisions and sending them to another division while maintaining the hollow division on the books.

Germany's political situation was also bleak. In Scandinavia, Finland negotiated a separate peace with Stalin in August. Norway was virtually isolated from Germany by the Allied naval blockade in the Baltic and North Sea. In September, Turkey and Bulgaria broke away from the Axis. In the south, Italy was lost except for the northern parts above the Gothic Line that remained under German control, and the Allies had command of the Mediterranean Sea. Except for Hungary and Japan, Germany had no Allies remaining to support her war effort. Even then, Hitler did not trust Hungary, but he maintained the alliance because of her strategic oil and raw materials. Meanwhile, Japan was negotiating with Germany to make peace with Russia while Japan was separately worked toward a peace accord with the Russians.¹⁵

Therefore, the military and political situation on all fronts was cause for concern. War production was beginning to decline, the Americans and the British were firmly established in France, the Russians were seemingly unstoppable in the East and Germany

was losing territory and allies. Furthermore, the military was largely a paper tiger that had many units that were incapable of accomplishing any mission. With this military and political situation in place, it is then important to understand the strategic situation of the German economy at the time the Hitler developed the idea of the Ardennes Offensive in the west.

Section II. German Industrial War Production Situation

Germany's war economy was not structured for a long war of attrition. The war lasted longer than Hitler had anticipated in 1938. The Nazi party primarily ran the German economy and focused primarily on supporting the military. Despite the difficulties that Germany faced on both the military and political fronts, German industrial production to support the war effort was impressive in most areas. However, there were two significant factors affecting the German industrial production: Allied strategic bombing and the loss of important territory that Germany captured early in the war. The remainder of this section will analyze the German war industry from the beginning of 1944 until the middle of September 1944. Many different areas will be analyzed and related to the influence on the Ardennes Offensive.

The primary factor affecting the German war industry was the Allied strategic bombing campaign. The focus of "Operation Point Blank" changed with the focus of the war. During the first half of 1944, British and American air forces concentrated their efforts on the German aircraft and ball bearing industries believing this to be the bottleneck for the German war machine. To overcome the vulnerability to air attack, Germany rationed production output and dispersed production capabilities in these industries. In May and June, as the Allies attempted to isolate the battlefield in

preparation of their invasion at Normandy, they shifted their secondary efforts to German oil and nitrogen (nitrogen is used in the production of explosives) facilities. In the long term, damage to these industries would cause difficulties for the Germans if the Allied landings were successful. Meanwhile, the Allied secondary effort of air attacks continued on transportation, aircraft, and tank production sites. By September, the Allies occupied a significant portion of Northern France. They quickly established airfields in France and focused their air attacks on the German transportation and war production industries and other targets deeper in Germany than they were able to range from Britain.¹⁶

The Allied air attacks on German war production industries had various results. Germany had three large plants and one small plant that supplied all of the rubber products for the armed forces. Allied bombing attacks on these plants and related synthetic oil plants caused production to drop from a peak of 12,000 tons a month in early 1944 to 6,000 tons in September.¹⁷ Despite this drop, the rubber supply would not affect the war effort or the Ardennes Offensive.

In contrast to the rubber situation, the Allied air campaign against the synthetic oil plants significantly affected the production of explosives. Explosive production fell from 60,000 tons in early 1944 to 20,000 tons in September. To put this drop in production in perspective, explosive consumption in September for the armed forces totaled 70,000 tons. The difference between consumption and production caused dramatic reduction in reserves resulting in rationing orders.¹⁸ Explosive production continued to fall below actual consumption and hence caused some difficulties in supplying the required ammunition for the offensive.

The next industry to be attacked was steel production. Prior to and during the war, Germany had the largest steel production industry in Europe. However, there were two weaknesses that could disrupt production. One was the dependence on foreign raw materials. (Appendix A lists the raw materials Germany received from areas outside of Germany.) The other was a vulnerability to air interdiction. Despite these vulnerabilities, Germany produced two and one-half million tons in July 1944. Approximately 70 percent of this production was from the Ruhr district. The Ruhr district was critical to Germany's war industry and was located just inside Germany's border with Belgium and France. It would be a primary target for Allied attacks to damage the war effort once they entered Germany. Additionally, due to the loss of occupied countries (Russia, Sweden, France, and Yugoslavia) and access to raw materials located in these countries, the production of steel in the fall of 1944 was one-million tons a month. Reserve stocks of raw materials and steel absorbed much of the loss of production.¹⁹ Steel production would not be a significant factor in providing combat vehicles or ammunition shells to the Ardennes Offensive.

Next, combat munitions production was relatively unaffected by the bombing campaign and actually reached an all-time high during the third quarter of 1944. Shell and casing production was unaffected except for special items that required the raw materials from lost territories. Production of ammunition at the nearly 5,000 plants had tripled by the fall of 1944 over the production average of the past three years; weapons production increased four times.²⁰ Production of shells would not affect the support of the Ardennes, but the required explosives to fill the shells would restrict sufficient supplies of ammunition.

The wheeled vehicle industry was unaffected by the air campaign. Production of vehicles reached a high point in the summer of 1944. During the first ten months of 1944, the German Army Ordnance Department accepted 45,917 trucks, but truck losses during the same period totaled 117,719.²¹ Production during the first half of 1944 averaged 9,000 vehicles a month but began to slow significantly due to fuel shortages and backlog of transportation to move completed vehicles from the factories. Despite the number of vehicles produced, the fuel shortages caused by deficiencies in the oil production industry contributed to the inability to operate the vehicles on hand.²² Maintenance on motor vehicles also suffered because two of the three depot maintenance facilities were located in France and Russia. These depots moved back to Germany to prevent their capture. The depot in Russia relocated in the summer of 1943 and the one in France moved in 1944. The relocation caused a lapse in service provided to the field armies.²³ Many units in the Ardennes Offensive would be without wheeled vehicles for the attack. These shortages would force many units to use horses and wagons or use bicycles for mobility.

Allied air attacks had very little impact on German armored vehicle production. After stunning losses in Russia in 1943, Hitler started the Panzer program and gave it top priority with an objective of 2,100 combat vehicles a month. He made this goal knowing that the previous highest monthly production was 2,200 in February 1942. Although Germany never reached the new goal, the tonnage production by June 1944 had increased by seven times the amount of 1941.²⁴ In spite of systematic Allied air attacks on the eleven production plants, an average of 1,500 tanks and assault guns total was being shipped to both fronts each month.²⁵ In contrast to the movement of wheeled vehicles,

priority was given to movement of combat vehicles over wheeled vehicles. Units in the Ardennes Offensive would not be hampered by a shortage of combat vehicles.

The final industry to be affected was the aircraft industry. The German aircraft production was probably in the best situation of all war industries. Aircraft production began to share top priority with the tank program starting in March 1944. Fighter output was the main emphasis of the aircraft production program. During 1944, despite relentless Allied bombing attacks against aircraft industry sites, the Luftwaffe accepted 25,860 fighters. Impressively, the production of single engine aircraft increased from 1,016 in February to a high point of 3,031 in September 1944.²⁶ To counter the air attack threat, Germany dispersed aircraft assembly sites. This dispersion plan reduced the effect of the Allied air campaign and German aircraft production only dropped an estimated 15 to 20 percent. However, as Allied bombing started to erode the transportation system, this dispersion became a significant disadvantage to production because the Germans were unable to move parts, planes, and products to other plants.²⁷ Of significant note, the Me-262 jet fighter went into production in March 1944. Germany would have significant aircraft to support the offensive. However, the types of aircraft, maintenance of the aircraft, availability of spare parts, and availability of pilots would hamper Luftwaffe efforts during the Ardennes Offensive.

The second factor affecting the industrial production was the loss of important territory that supplied raw materials. Germany had few natural resources within her borders: oil, coal, and nitrogen. Such resources were needed to support the long-term war effort and were still available in mid-1944 but not in significant amounts. Germany was heavily dependent upon trade or import from captured lands. At the beginning of

1939, Germany received necessary war materials from several sources. (appendix A). The prewar years and early successes allowed Germany to stockpile reserves of many of these materials. However, due to the recent loss of these lands, Germany started to use strategic reserves to match consumption demands. The majority of the countries listed in table 1 were lost to German by the middle of September and Germany no longer received natural resources for war production.²⁸

Coal was the one material that Germany had in abundance. Germany was one of the world's largest producers at the start of the war. Coal was used in the production of more than 90 percent of the total energy produced in Germany. This energy produced from coal was also significant as it provided the energy for the synthetic gas, oil, rubber, explosives, and steel industries. Germany traded coal to occupied countries for other raw materials. By March 1944, Germany imported 20 percent of her total coal requirements.²⁹ Due in part to the significant amount of coal in Germany and the relatively large effort it would require to damage this industry, the Allies did not concentrate their air campaign efforts at the German coal industry until later in the war. Coal would continue to support Germany's war production and therefore indirectly influenced the Ardennes Offensive.

In 1943, Germany's oil production was slightly more than six-million tons: 25 percent from Germany, Austria, Poland, Alsace, and 25 percent from the eighteen synthetic oil production plants. Nine of the synthetic oil plants produced more than 90 percent of the total synthetic oil. Moreover, these plants provided over 80 percent of the aviation fuel. Germany received the remaining 50 percent of oil from the Ploesti oil fields in Rumania. With the exception of Hungary, Germany lost most of the oil-

producing territories she had either occupied or controlled by the middle of 1944. The vital Polesti oil fields in Rumania fell to the Soviets on 30 August 1944. The Allied strategic bombing in 1944 of the synthetic oil facilities caused the strategic reserves of aviation, diesel, and motor fuel to drop sharply. Aviation fuel production was roughly 160,000 tons a month in early 1944 while the Luftwaffe consumed 195,000 tons. Diesel fuel production dropped to approximately 60,000 tons in the fall of 1944.³⁰ This was the most significant logistics commodity in preparation for the offensive. Oil and fuel production would influence the other factors of moving and sustaining the force. During the buildup for the offensive, Oberkommand Wehrmacht (OKW) would restructure units from motorized to horse-drawn or bicycle or walking due to lack of fuel.

Once materials were produced for the war or personnel obtained for units, they had to be moved to other industries or to the units in the field. Railroads, inland waterways, and highways were the three basic modes of transportation within Germany. Rail accounted for approximately 75 percent of the military traffic, water moved approximately 20 percent, and roads moved around 3 percent. It is ironic that the main use of Hitler's single biggest accomplishment, the construction of the Autobahn, was by his retreating forces. Despite heavy bombardment by Allied bombers, the German railway system remained relatively viable. Troops were able to move with relatively few delays. In mid-August, weekly rail loading by the Reichsbahn was almost 900,000 railcars.³¹ This is significant since many of the units and most of the supplies for the Ardennes Offensive would be moved by rail to the built-up area.

Overall, Germany reached her highest levels in war production by the summer of 1944. However, the landings in Normandy in June 1944 allowed Allied air forces to

position themselves closer to German industrial sites. The Allies then increased their strategic bombing that caused German production to decline for the rest of the year. In addition, the loss of key raw materials was starting to degrade certain areas of war production. The most critical areas were fuel and explosives production. The loss of these materials resulted in Germany consuming large amounts of strategic raw materials reserves. On 3 September 1944, Production Minister Albert Speer estimated that the remaining reserves would last through the end of 1945.³² After this analysis, it is easy to conclude that Germany possessed the capacity in manpower, transportation, and industrial capacity to build up and initiate a major offensive.

Section III. Hitler's Strategic Assessment

In September, Hitler began to analyze his military, political, and war production situation. He had a retreating disorganized army, no Allies to come to his aid, and a population that needed a victory. Hitler was a believer and follower of Frederick the Great and Clausewitz. He believed he had to end the two-front war quickly. He needed a counterattack to strengthen the resolve of his troops and the population. He also wanted to demonstrate to the Allies that Germany was still capable of a staunch defense. Hitler began to analyze the location and requirements for a successful offensive.

Hitler realized that an offensive in the East would accomplish nothing significant since the Soviets had no specific weaknesses or center of gravity that could be rapidly attacked. Italy was too narrow and would have no impact on fighting elsewhere. However, the Western Front offered several advantages to meet his desired results. The advantage was based on the American and British center of gravity. The Allies relied heavily on their supplies coming from the ports. Over 400,000 tons of supplies daily

were coming from ports in the Normandy region of France via the Red Ball Express to the First and Third US Armies--a one-way trip of over 350 miles.³³ The most important port to the Allies, Hitler reasoned, was the newly captured port of Antwerp. British troops captured the port intact on 4 September but German troops in the Schelde Estuary blocked any Allied ships from safely entering the port. Hitler realized once the Allies opened Antwerp, they would have shorter interior supply lines and would be much harder to contain. Hitler knew that the opening of Antwerp would take several months. With this in mind, he estimated that before the Allies could use Antwerp, they would outrun their supplies and would have to conduct an operational pause. The Allies were already showing signs of slowing their offensive due to the time required delivering supplies from Normandy. This operational pause, he thought, would allow him to reorganize and establish a firm defense along the Siegfried Line while he organized an offensive to capture Antwerp.³⁴ He believed the worst case result of an offensive in the West would be that the British north of Antwerp would escape and that the Americans south of Antwerp would be pushed back to the battle lines of August. This setback for the Americans and British, he hoped, would give him a four-month operational pause in the West to concentrate his efforts on the Eastern Front. Hitler's best case scenario was that the offensive would cause a rift between England and America, thus causing the alliance to fracture and he could then make peace with the Americans and British and concentrate his efforts on the Soviets. Finally, an attack in the West would help in maintaining and protecting the production of the Ruhr industrial sites.³⁵

With these factors in mind, Adolf Hitler stated his intentions at a meeting of his essential leaders on 16 September 1944. He stated, "I have just made a momentous

decision. I shall go over to the counterattack, . . . here, out of the Ardennes, with the objective--Antwerp."³⁶

¹Hugh Cole, *The Ardennes: Battle of the Bulge, US Army in WWII* (Washington, DC: Center of Military History, 1988), 2.

²Martin Blumenson, *Breakout and Pursuit, US Army in WWII* (Washington, DC: Center of Military History, 1993), 700.

³William Goolrick and Ogden Tanner, *Battle of the Bulge, World War II* (Alexandria, Va.:Time-Life Books, 1979), 24.

⁴Trevor Dupuy, *Hitler's Last Gamble* (New York, NY: HarperCollins Publishing, 1994), Appendix C, 409-423

⁵John Keegan, *The Second World War* (New York, NY: Penguin Press, 1989), 482.

⁶Cole, 13.

⁷Dupuy, 411.

⁸Cole, 3.

⁹Charles V. von Luttichau, "The Ardennes Offensive, Germany's Situation in the Fall of 1944, Part One: The Political Situation" (Washington, DC: Office of the Center of Military History, DA, 1953), 29, photocopied.

¹⁰Charles V. von Luttichau, "The Ardennes Offensive, Germany's Situation in the Fall of 1944, Part Two: The Economic Situation" (Washington, DC: Office of the Center of Military History, DA 1953), 46, photocopied.

¹¹Cole, 2.

¹²Luttichau, "The Ardennes Offensive, Part Two," 46.

¹³Cole, 7.

¹⁴Cole, 7-8.

¹⁵Luttichau, "The Ardennes Offensive, Part Two," 42.

¹⁶*Ibid.*, 43.

¹⁷*Ibid.*, 58.

¹⁸Ibid., 59.

¹⁹Ibid., 60-61.

²⁰Ibid., 61.

²¹Cole, 5.

²²Luettichau, "The Ardennes Offensive, Part One," 62.

²³Department of the Army, DA Pam 20-202, *Historical Study, German Tank Maintenance in World War II* (Washington, DC: Government Printing Office. 1954), 26.

²⁴Luettichau, "The Ardennes Offensive, Part Two," 63.

²⁵Cole, 4.

²⁶Ibid., 4.

²⁷Luettichau, "The Ardennes Offensive, Part Two," 64-67.

²⁸Ibid., 48.

²⁹Ibid., 49-50.

³⁰Ibid., 52-57.

³¹Ibid., 67-68.

³²Ibid., 71.

³³Goolrick and Tanner, 27.

³⁴Luettichau, "The Ardennes Offensive, Part One," 17.

³⁵Cole, 13.

³⁶Ibid., 2.

CHAPTER 2

PREPARATIONS AND BUILDUP FOR THE OFFENSIVE

Hitler's counteroffensive called for massive force restructuring, a significant logistics buildup, secrecy, and surprise. He promised thirty divisions and 2,000 planes to support the offensive. This chapter will discuss the plan for preparations and execution of the buildup.

Chapter 1 of this thesis explained the state of the German war production and military and political situation from which Hitler expected to produce the required forces and supplies for this last great offensive. Now, let it will examine the German economic situation during the preparations for the Ardennes Offensive to gain a perspective on just how efficient the German staff was in planning and accomplishing the logistics preparations. This review of the economic situation will show a desperate situation in all aspects of war production and resources required for war. It will also illustrate the inability of the German war industry to provide sufficient equipment, fuel, and ammunition to the force to accomplish the mission.

Section I. War Industry Production Situation, 16 September to 15 December 1944

Hitler made his decision to launch the Ardennes Offensive based on a war industry production situation of mid-September. It is difficult to believe that he forecasted how the production situation would evolve in the next few months and how that would affect his ability to resource the offensive. The Allies were taking ground in the West after the German collapse in France; Italy was falling; and the Russians were in an operational pause of their offensive in the East.

Raw Materials Situation

By December 1944, all the countries mentioned in appendix A were lost and Germany no longer received supplies from outside sources. Rumania was the most significant loss because of the Polesti oil fields. This loss would significantly degrade Germany's ability to replace losses and supply sufficient materials to the Ardennes Offensive.

Coal was the only resource that Germany had in any significant amount. However, in the last quarter of 1944, the situation was steadily growing worse. Coal was significant in that it provided the fuel source for most industries--especially steel production. There were four factors affecting the coal situation: increasing demand, declines in production, inability of transportation to move stocks, and the reduction of the labor force. Allied air attacks accounted for a 50 percent drop in Ruhr coal production. Again, the transportation deficiencies noted earlier resulted in problems in moving the coal to needed areas.¹

Hitler based his plan for an offensive on a poor petroleum situation that progressively worsened toward the time of the start of the offensive. The loss of the Polesti oil fields in Rumania and Allied air attacks on petroleum production facilities had a significant impact on fuel production and significantly affected the Ardennes planning and buildup. Consumption by the military and civilian sectors increased despite attempts to cut use while production dropped significantly.

Situation of German War Industry Production

Chapter One discussed the situation of the war industry during the period of 1944 before Hitler made his decision to launch the Ardennes Offensive. This section will

discuss the situation of the German war industry from 16 September until 15 December. It will discuss the impacts of Allied air attacks on the war industry severely degraded production and had a dramatic effect on the logistics preparations and condition of units before the start of the Ardennes Offensive.

Explosive Production

Allied air attacks on the synthetic oil industry degraded German explosive production. Production of explosives was only 20,000 tons in December--a 30 percent decrease from the beginning of the year. A lack of nitrogen, a principal in the production process, from outside sources greatly degraded the production of explosives. Despite the difficulties, explosive requirements for the offensive were met at the expense of other theaters and reducing strategic reserve inventories.²

Ammunition Production

Although production of ammunition increased during the buildup, the shortage of explosives was the bottleneck. Significant inventories allowed planners to meet requirements for the Ardennes Offensive. The only significant shortage was in 120-millimeter antiaircraft and mortar ammunition. This would cause significant problems during the offensive when German AAA units would be without ammunition to suppress the massive American air forces. Ammunition supply was not the determining factor in the Ardennes Offensive. Distribution was the major factor.³

Steel Production

Steel production was severely reduced by the year's end. Allied bombing of the Ruhr district reduced production to about one million tons. On-hand inventories were high enough to make up for losses in production and did not affect preparations for the

offensive. However, due to the lack of raw materials coming from other countries, raw material reserves could not be replaced.⁴

Fuel Production

Fuel was the single most influential class of supply during the preparations for the Ardennes Offensive. Fuel production industries were a primary target of Allied bombing and oil received from outside Germany was reduced to nothing. Allied bombing caused aviation fuel inventories to drop to 160,000 tons, motor gasoline to 140,000 tons, and diesel oil to 110,000 tons by September 1944. Aviation fuel production decreased to only 26,000 tons in December. This was down from a high of over 200,000 tons in early 1944. In May, the Luftwaffe used 195,000 tons. In December, their consumption dropped to 44,000 tons. Consumption was being curtailed to save fuel for the offensive; however, this reduced the ability of the Luftwaffe to conduct reconnaissance or defend against attacks on vital areas. Hitler was truly gambling on the success of the offensive. At peak consumption rates, aviation fuel would last another month; at the reduced rate, it would stretch another four months.

Motor gasoline production reached a high in production of 200,000 tons in the spring of 1944 but slumped to 50,000 tons in December. To save fuel for the offensive, OKW enforced restrictions that reduced military fuel consumption to 70,000 tons in early December. Of this amount, planners allocated approximately 25 percent to the Ardennes offensive. The shortage of fuel would cause severe problems during the buildup for the offensive. Units would be limited in movements that would restrict reconnaissance, rehearsals, and supply movements.

Production during the period of the Ardennes preparations for all three types of fuel was 536,000 tons. The Mineral Oil Plan of 1944, before Allied bombing, projected 1.72 million tons for the same period. The last reserves of the Wehrmacht, industrial, and civilian sectors were depleted to meet the fill requirements for the Ardennes Offensive. Field Marshall Wilhelm Keitel, Chief of OKW (German Department of the Army), was directly responsible for the distribution of fuel for the offensive. To acquire sufficient stocks for the offensive, OKW cut fuel allocations to other fronts to below minimum requirements. On 7 December 1944, in a memo to the Commander, OB-West, Field Marshall Rundstedt, Keitel stressed the significance of Allied air attacks on fuel production. He stressed that the attacks on the German oil industry had resumed and that fuel losses were irreplaceable. His report indicated that inventories of motor fuel would last another two weeks or rationed for another two months. The home front and other theaters made the last sacrifice to make the offensive possible. Despite this desperate situation, OB-West received the allocated amount for the Ardennes Offensive. However, this was at great sacrifice to other military fronts and the civilian sector.⁵ Even though the required amount of fuel was provided to OB-West, Hitler directed that half the stocks be retained east of the Rhine for two reasons: (1) if the Allies conducted an offensive during the buildup, the stocks would be protected; (2) positioning stocks east of the Rhine would support the deception plan of a defense of the Rhine.⁶

Motor Vehicles

The decrease in production seen in the first half of the year continued. In October, only 4,500 vehicles were produced. Production further decreased to only 3,000 in December. The shortage of fuel continued to plague vehicle production. Lack of fuel

disrupted shipment of newly produced vehicles produced. Shortages of fuel in units prevented the few units that received vehicles from using them once received from the quartermaster.⁷ In a later section, the impact of the vehicle shortages will be discussed.

Armored Vehicles

Allied attacks on tank production facilities had relatively little effect on production. An average of 1,500 tanks and assault guns were produced and shipped to the front each month during the buildup. Allied bombing of tank plants stopped in November, and tank production caused no significant issues during the Ardennes buildup.⁸ However, there were significant difficulties with tank maintenance and supply of repair parts. At this time in the war, there were forty-three varieties of German tanks. This presents a problem with repair parts supply and maintenance training. In addition, as contractors developed new ideas, they would change the production line and issue tanks with upgrades and features. These new tanks and variations on current models caused problems in maintenance and repair. Maintenance soldiers and crew members did not have time to train in the maintenance. Likewise, there were very few spare parts available in the maintenance companies to repair malfunctions.⁹

Aircraft Production

During the buildup for the offensive, the Luftwaffe accepted 10,996 fighter planes. The production industry was dispersed and less vulnerable to Allied air attacks. However, when Allied bombings disrupted transportation, dispersion became a handicap. During the preparations for the Ardennes Offensive, the Luftwaffe strength reached an all-time high in numerical strength. During the buildup, the Luftwaffe increased to 3,300 planes--almost 70 percent increase.¹⁰

Electricity

Allied air attacks resulted in a 33 percent reduction of electric output. Attacks on electric plants and the inability to receive coal were factors affecting the reduction. This low electrical output affected the production of aluminum and nitrogen.¹¹ Aluminum is used to produce planes while nitrogen is used to produce ammunition. These would affect the ability to provide sufficient planes and ammunition for the offensive.

Transportation

During the period of the operational buildup for the Ardennes Offensive, the Allies began large scale bombing of supply lines along the Western Front. This effort was so intense, the Germans believed the Allies were attempting to create a "transportation wasteland" in the West. The efficient German rail system was a target of Allied bombing. The bombing of the railroads, in addition to the bombing of the Ruhr district, greatly reduced Germany's ability to move materials and supplies. During the month of October, 703,580 rail cars were loaded. November saw a shift in Allied bombing away from the Ardennes area to support the Allied attacks on Aachen. This resulted in an increase in the number of rail cars loaded to 805,884 cars. In December, Allied bombers were again targeting the rail system and the number of railcars loaded dropped to 547,309. By the end of 1944, marshalling capacity dwindled to 40 percent. Backlogs of railcars due to interruptions in the rail lines grew to 1,700 trains in November. By the middle of December, approximately 7 percent of the German railcars were uploaded with equipment and awaiting movement. By 2 December, the Germans believed the Allies were trying to isolate the Ruhr district with air interdiction and bombing. This isolation caused the railcar turn around in the Ruhr district to fall from

22,000 cars in January 44 to 7,000 cars in December 44. The immediate result was that industries in Germany, especially in the southern regions, were receiving insufficient coal while coal piled up in the Ruhr district. This isolation by the Allies caused vital coal operated industries such as electricity, and steel to reduce operations due to insufficient coal shipments.¹²

Despite the difficult rail communications situation, a strict priority system ensured that military transport arrived at their destination. The rail problems mainly affected nonmilitary traffic. During the Ardennes buildup, traffic was interrupted in approximately one-third of all movements. Meanwhile, several important cuts in bridges over the Rhine at Cologne halted Rhine River traffic after 14 October.¹³

To summarize the economic situation, it is easy to see that Germany could maintain the buildup required for the offensive but only at the cost of severe curtailment of civilian and other military theaters. The only significant difficulty was in all three categories of fuel. However, this was overcome by the sacrifice in other theaters. The difficulty caused by the Allied bombing caused significant shortages. Even if the offensive could be successful, it would be difficult to sustain the forces over a significant period.

Section II. Results of Allied Bombing

In September, Allied targeting shifted to transportation centers and in October to the Ruhr District. The Ruhr district was Germany's primary industrial manufacturing region. It was vital to the German war machine and civilian economy that Germany retain control of the region and continue to receive war materials. Meanwhile, attacks on aircraft, tank and motor transport industries continued. These bombings resulted in a 25

percent reduction of aircraft output and a 20 percent decline in motor transport and tank output. Attacks on the Ruhr steel industries caused production to drop 43 percent from October to November. By the end of 1944, production of combat munitions had dwindled to two-thirds of the August-September levels. However, the attacks on the transportation centers and infrastructure overshadowed the shortages. Materials produced were difficult to move to the areas they were needed.¹⁴

Section III. Luftwaffe Situation

The situation for the Luftwaffe was not encouraging. Fuel was the main concern within the Luftwaffe with aircraft availability a close second. The general policy was one of a concerted effort to conserve fuel and assets. This resulted in a stockage of reserve fuel and ammunition as well as an increase in serviceable aircraft.¹⁵ The past few months of near uninterrupted Allied air superiority caused many problems for the Luftwaffe. Despite these problems, FM Herman Goering, Commander of the Luftwaffe, was able to equip and recommitted fifteen decimated Luftwaffe units by the end of October. The strength of twin-engine fighters increased by 25 percent from the beginning of the year. However, monthly German losses averaged 1,800 single-engine fighters in the West alone. This, along with the increase in deliveries, resulted in only a slight increase in actual availability of aircraft. The readiness emphasis on fighters was accomplished at the expense of the bomber and reconnaissance arms of the Luftwaffe.¹⁶

Regardless of the number of planes, the desperate situation in aviation fuel limited use of the new planes. As mentioned earlier, aviation fuel production was suffering and stocks were being depleted. The shortage of fuel had two primary effects. First, pilot training was cut from 250 hours to 110 hours. Secondly, as a result of pilot and fuel

shortages, Luftwaffe planes were only able to engage Allied missions over Germany on an average of four days a month compared to the Allies who conducted missions on a daily basis.¹⁷ At the start of the offensive, Luftwaffe Command West had a strength of 2,292 planes of all types of which only 1,376 were operational.¹⁸

In September, there were seventy-five serviceable airfields within a 125-mile radius of the Ardennes Offensive staging area. However, within the first four weeks of the buildup, thirty-four of the airfields were rendered unserviceable or partially unserviceable by Allied air interdiction. Poor soil conditions inhibited the repair of damaged airfields. To make matters worse, none of these airfields was suited for winter operations. These conditions forced the Luftwaffe to consolidate aircraft at a few bases. Additionally, the Germans wanted these forward airbases to conserve fuel and provide maximum time on station for ground support. This consolidation resulted in overcrowding of aircraft and gave Allied aircraft a target-rich environment when attacking these airbases.¹⁹

By December 1944, the Luftwaffe received 527 Me-262 jet fighters. The Luftwaffe fielded the first Me-262 units this same month. However, technical problems and an effort to conserve aviation fuel resulted in a lack of pilot training. This would result in the Me-262 having no significant influence on the war much less the Ardennes Offensive.²⁰

Approximately 75 percent of single engine fighters in the Luftwaffe were located on the Western Front--an amount of approximately 1,500. Of these, approximately 70 percent were serviceable. German production of single engine fighters for October was 850 ME-109s and 650 FW-190s. Production of twin engine fighters was 240 aircraft

with the majority being Me-110s, which were used mainly as night fighters. The strength of the Me-110s had grown to over 700 by November. Approximately 225 bombers were located in the area and were used for night bombing of Allied supply lines.²¹

During the preparations and buildup for the offensive, the Luftwaffe was mainly used for reconnaissance. Planes were also used to fly up and down the front to attempt to drown out the sound of vehicles moving into place on the final few days before the assault.

Such was the situation in Luftwaffe preparations for the Ardennes Offensive. Although there was a rather large number of fighters and bombers in the area, restrictions on fuel usage would limit the effectiveness of the Luftwaffe during the buildup. This situation resulted in the Ardennes Offensive being the first offensive the Germans launched without air superiority.²² As the offensive would unfold, the results of the unprepared Luftwaffe would be fatal.

Section IV. Allied Situation

Next, it is important to view the actions of the Allies during the buildup phase and how these actions would affect German logistics efforts for the Ardennes Offensive. Much of Hitler's plan depended on the Allies remaining static and the Germans holding the line of September. This thesis paper will not cover the full range of Allied operation in the West, only those aspects that affected the German offensive or logistics preparations.

In an effort to secure access to the port of Antwerp, British and Canadian troops surrounded the Germans on 3 November in the Schelde Estuary at the mouth of the Rhine and accepted their surrender. Although Antwerp was now in Allied control, the Allies

would have to clear the mines in the estuary before the port could be used. The Germans were unable to demolish cranes or docks and the port required only minor repairs. The port was finally available to Allied shipping on 28 November. This provided a major port to receive supplies and greatly cut the resupply time to units at the front that were stalled by fuel shortages. Once Antwerp was opened, the priority of the Red Ball Express from Normandy shifted to Antwerp. By November, the Allies were using La Havre, Rouen, Cherbourg, and ports in Southern France as primary ports with over 1.2 million tons of supplies. By December, over 420 thousand tons of supplies were arriving at Antwerp--27 percent of all Allied supplies.²³ This was what Hitler expected and wanted. Now, if successful, the capture of Antwerp would bring about the results he wanted from his offensive.

On 16 November, the Allies began an expected attack over the Rohr River toward the Rhine. At the beginning of this offensive, 2,500 Allied bombers dropped more than 9,400 tons of high explosives on German positions and reserve locations in the heaviest tactical bombing of the war to date.²⁴ This disrupted operations in that area and caused OKW to shift two divisions designated for the Ardennes to Fifteenth Army to block the Allies advance.

Meanwhile in France, the Allies were able to forward stage bombers on the continent. This increased the range and reduced the turn-around time for bombing raids on German industry and transportation centers. I do not believe Hitler expected Allied strategic and operational bombing to degrade war production to the degree it did. The Allies were in a situation that Hitler envisioned: tied to a port and with over stretched

lines of communications. However, Hitler did not expect the Allies to possess such superiority in the air.

Section V. Planning for the Offensive

On 25 September, the German General Staff began the staff planning process to develop courses of action to meet Hitler's guidance. Hitler's guidance had several major points: (1) the attack should be sometime between 20 and 30 November; (2) it should be made through the Ardennes sector; (3) initial objective to seize bridges over Meuse River; (4) thereafter, Antwerp would be the objective; (5) annihilate the British and Canadians north of the Antwerp-Liege-Bastogne line; (6) a minimum of thirty divisions would be available, ten of which would be armored; (7) support would be given by an unprecedented concentration of artillery and rocket units; (8) operational control vested in four armies--two Panzer armies abreast in the lead, two armies composed largely of infantry to cover the flanks; (9) the Luftwaffe would support the operation; (10) all preparations would aim at securing tactical surprise and speed; (11) secrecy would be maintained at all costs and only a limited number of individuals would be made privy to the plan,²⁵ and (12) the provisions of only fresh units of full fighting capacity for the offensive.²⁶ The staffs of the Wehrmacht and Army Group B applied all of this guidance when developing courses of action but available resources convinced them that only a smaller objective could be accomplished. As the planning for the offensive progressed, Army Group B became overwhelmed with having to plan the offensive and control fighting on the front. To solve this problem, OKW created Army Group H on 29 October to control Holland and the fighting in Aachen, thereby allowing Army Group B to devote time and planning to the offensive.

Two critical errors that occurred up front affected the remainder of the planning. First, Field Marshall (FM) Rundstedt, Commander of OB-West, the theater where the Ardennes Offensive was to occur, was not informed of the impending operation. Likewise corps and division commanders were informed four days from the start of the offensive, regimental commanders two days, and company level commanders were informed on 15 December.²⁷ Secondly, only the OKW was involved in planning for ammunition and fuel requirements. General Alfred Jodl, Chief Armed Forces Operations Staff, completed the remainder of the planning. This was to maximize secrecy of the plan. These errors caused problems in that OKW and OB-West did not know planned units, locations, missions or concept of maneuver with which to calculate fuel and ammunition requirements. This was the start of a series of logistics problems caused by the secrecy plan. These logistics problems will be identified throughout this paper.

The General Staff developed five different courses of action from which Hitler combined two into what has been called the "Big Solution." Jodl believed the means were not adequate to achieve this new plan but preferred not to oppose the Fuehrer's plan.²⁸ On 22 October, Hitler held a planning conference at the Wolf's Lair with Lieutenant General (LTG) Siegfried Westphal, Chief of Staff OB West, and LTG Hans Krebs, Chief of Staff Army Group B. At this meeting, two target dates were fixed: 15 November for the end of preparations and 20 November for the start of the offensive. These dates were to coincide with forecasted poor weather and a new moon to reduce effectiveness of Allied air forces. A troop list was produced for the planners that included thirteen infantry divisions, two parachute divisions, and six Panzer divisions. It should be noted that this plan was nine divisions below the instructions that Hitler

demanded. However, three infantry divisions and six Panzer divisions included in this planning would have to be withdrawn from the front lines by OB West and refitted. This would weaken the already thin defensive lines, since there were only nine Panzer divisions within the entire OB West theater of operations. Hitler promised an additional five motorized antiaircraft regiments from the Luftwaffe, twelve Volks Artillery Corps, and ten rocket projector brigades. Field Marshall Keitel promised 4.25 million gallons of fuel plus fifty trainloads of ammunition in excess of current consumption. Model and Rundstedt submitted several other plans to Hitler commonly called the "Small Solution." The major point of contention between the two courses of action was the amount of units available to achieve the "Big Solution." Many commanders did not believe there were sufficient units available to achieve and sustain the objective. Field Marshall Jodl calculated it would take extreme measures to create necessary units.²⁹

Much discussion has arisen since 1945 from the suggestion that the offensive depended on captured supplies. Field Marshall Jodl stated that no such orders came from the Wehrmacht planners.³⁰ However, some captured orders from tactical units stated the importance of captured supplies--especially fuel. I believe that the lower level tactical commanders (division level and below) realized the shortages in fuel and issued orders for units to capture fuel when possible.

A problem with movement and fuel planning was that many units had more equipment than they needed. Armored divisions normally used sixty-two trains for movement. However, when units requested 120 trains, planners knew the unit had more equipment than required. Much of this additional equipment was captured vehicles being

used by troops either to make up for shortages or for dismounted infantry wanting vehicles for movement.³¹

Some activities directed by higher headquarters added to the logistical difficulties. Hitler ordered an artillery preparatory barrage to start the assault, which should destroy enemy targets within range of German artillery. Artillery and rocket projectors should be extensively supplied with ammunition. The first priority was to stocks for the preparation barrage with secondary effort to supplies for the assault. Hitler placed particular emphasis on forward placement of engineer units and on the supply of engineer material to enable river crossings.³²

In order to provide the specified number of units for the offensive, OKW undertook massive restructuring of some units. The rebuilding effort faced some tough challenges. Many units were decimated earlier in the year and were shells of their authorized strengths. Notable examples were the Panzer Lehr Division (PLD) and the 2nd Panzer Division. The PLD was originally designed for 17,200 men and 190 tanks, but by September had only two companies and five tanks. Battles from Normandy and across France reduced the 2nd Panzer Division from 20,000 men and 238 tanks to 2,650 men and one serviceable tank by the time it had retreated to the German Border.³³ To improve the combat vehicle situation OKW set the Western Front as priority for receiving supplies from armament plants. In November, 1,349 tanks and assault guns were sent to refit units and another 1,000 were sent in December before Christmas. In lessons learned from Russia, Germany created snow-clearing units and put them on standby to clear roads. Tanks were developed to spread sand on the icy high-grade roads.³⁴

To find soldiers for the new units, the Wehrmacht instituted the changes mentioned in Chapter One. As the new work structures took effect, manpower became available. This source of manpower was used to create a new type of unit--the Volksgrenadier Divisions (VGD). The purpose of the Volks Grenadier Division was to provide sufficient mobility with as much firepower as possible with the least possible use of personnel and equipment. These divisions were organized with 10,000 men as opposed to the earlier German infantry divisions that contained 17,000 men. The structure of the Volks Grenadier Divisions was not uniform but was generally three regiments with two battalions each. The reason for differences was mainly due to the shortage in weapons and equipment. To offset the reduced firepower of the Volks Grenadier Division, the soldiers were issued more automatic weapons and large numbers of the 80-millimeter Panzerfaust German shoulder fired antitank weapon. Although the Volks Grenadier Division was lacking manpower and firepower, it was equipped with the most modern infantry equipment and filled with experienced officers and non-commissioned officers. The ineffective Luftwaffe and idle Navy supplied most of the troops.³⁵

Manpower that came from the expansion of the draft age was used to form the Volksturm. SS Reichfuehrer Heinrich Himmler controlled training for the Volksturm. The Volksturm was used to complement the Wehrmacht in direct defense of the soil of the homeland. They were used to provide defense of civil sites and industries. These Volksturm units were equipped with a vast array of equipment consisting mostly of weapons left over from World War I or captured from other countries for which there was a lack of ammunition. These units did not have standard uniforms and wore World

War I steel helmets. Only a red and white armband gave any semblance of a uniform. Older soldiers were used to form battalions and replaced active duty manning the Siegfried line. These replacement battalions consisted of older soldiers and soldiers that suffered ailments that prevented them from serving in front line units. German soldiers called these new units "stomach battalions" due to the large number of sick and lame soldiers. The active duty units were then used to fill divisions targeted for the offensive. Many of the "Hitler Youth" units were a part of the Volksturm and served both on the front lines and in protection of cities and industries.³⁶

On 8 October, the Chief of the Replacement Army informed General Jodl of the units that would be available by 10 December: twenty-four Volks Grenadier Divisions, two paratroop divisions, twelve Panzer and Panzer grenadier divisions, twelve Volks Artillery Corps, fourteen battalions of independent Army Artillery, ten Volkswerber Brigades, sixteen antitank and assault gun battalions, four engineer battalions, six to ten bridge columns, one bridge battalion, and one assault boat company. This would meet Hitler's objective of 30 divisions; however, it was known that some of the Volks Grenadier Division units would be sent to other fronts.³⁷ Therefore, Hitler's goal of thirty divisions could not be met by the creation of new units but would require additional units to be withdrawn from the front lines elsewhere and moved to the Ardennes sector. The Foreign Military Studies manuscript A-977 provides an excellent breakout on the timeframe for the creation of these divisions.

Panzer units would also require reorganization and reequipping with new equipment. Ten new Panzer brigades were established around a core of forty tanks. These brigades would be structured with two battalions of twenty tanks each and an

infantry battalion. These units were given priority fill of the new medium Panther and heavy Tiger tanks.³⁸ The reorganization of the Panzer units is outlined in Appendix B. Table 1 shows the allocation of panzers to units. Table 2 illustrates the initial number of units that were planned on 11 October and the status of each type of unit that was employed on 16 December, added during the Ardennes Offensive and how many were not reorganized by the time they were committed during the Ardennes Offensive. Table 3 illustrates the breakdown of divisions by major command.

Panzer units had problems with reorganization. German Panzer and SS Panzer divisions had one Panzer regiment and two Panzer Grenadier regiments. The divisions averaged 90 to 100 medium tanks. Both had a self-propelled antitank battalion. However, the Panzergrenadiers lacked mobility. Only half of the troops rode on half-track vehicles and material shortages reduced the remaining troops to traveling on a collection of German trucks and captured equipment. Of the three artillery battalions assigned to the divisions, only one was self-propelled. In the SS divisions, one of the four was self-propelled. Of note, within the Panzer units, although they were uniform at battalion level, there were five models of main battle tanks including experimental tanks.³⁹

To makeup for a shortage of vehicles and fuel, German artillery was generally horse-drawn. This made artillery slow to displace and move forward to support the advance. The Volks Artillery Corps ranged from 50 to 100 guns. This included many captured weapons that complicated ammunition requirements. The seven new Nebelwerfers (Rocket Propelled Artillery) brigades were motorized and were to be used once the advance progressed beyond the support of standard artillery.

Overall, the planning for the offensive was quite extensive and complete. Planners conducted an amazing restructuring and mobilization to create new divisions and reorganize decimated units all within a span of a few months. The elaborate deception plan maintained secrecy under intense enemy air superiority and bombardment. Finally, the planning was compartmentalized at both the strategic and operational levels while tactical commanders were unaware of why they were truly being reorganized.

Section VI. Terrain and Climate

The Germans knew the Ardennes area from their advance in the area in 1940. However, when the planners went to retrieve their orders and plans from the 1940 assault, they discovered that a fire from Allied bombing had destroyed the files. Hitler took terrain into consideration when planning the Ardennes Offensive. Hitler wanted a quick assault through the area to capture bridges across the Meuse then push on to capture Antwerp. After the Meuse, the roads and terrain favored tank mobility. However, the terrain of the Ardennes was not conducive to tank warfare.

The Ardennes Forest presented unique challenges. These challenges are a limited road network caused by the hilly terrain, dense forests, numerous rivers and hills and winter conditions. There are very few heavy-duty roads that tanks could use and none ran east to west. Most of the good roads run northeast to southwest. The minor roads in the Ardennes were usually unpaved, very narrow, and curvy. These minor roads had poor surface quality that would quickly turn to mud and ruts if traveled by heavy units or large numbers of vehicles. Finally, the roads that lead from the assembly areas to the initial battle positions were similar to the above terrain. Reinforcements and resupply would have to travel in similar terrain. Roads in the area would require heavy

maintenance to keep open.⁴⁰ Bastogne and St. Vith were the two major road and rail networks that dominated the area. Bastogne was key to bringing supplies to front line divisions and was to be captured by 23 or 24 December.⁴¹

Rivers are another terrain issue facing the German axis of advance. The numerous rivers in the region run parallel to the proposed axis of advance. These rivers passed through deep river valleys, normally 500 feet below the rim of the ridge, which offered favorable positions to defending units. The priority of aerial reconnaissance was to determine the existence of bridges, which bridges required repair, and whether pontoon bridges were in use by the Americans.⁴²

The conifer tree woods on either side of these roads were very thick and mobility was impossible for vehicles and difficult for ground infantry. The limited open ground was soft and limited movements even in good weather. In winter, cross-country travel was difficult unless the ground was frozen. Hitler accepted the risk of unfavorable terrain in favor of surprise and the anticipated results. Field Marshall Jodl stated that they had expected hard, frosty ground that would enable them to move through the Ardennes in one day.⁴³

The weather in the Ardennes in the winter is very unpredictable and cold. Due to the elevation of the Ardennes, snow was a possibility at anytime and low clouds and fog are common. Fog and low clouds aided in hiding the buildup from Allied reconnaissance planes. Finally, fog over the Ardennes during the last three days of the buildup concealed the movements of the German assault units to their final assault positions.

After reviewing the terrain and climate, the three Army commanders believed it would take at least four days to reach the Meuse because of the unfavorable terrain and the difficulty of the roads.⁴⁴

Section VII. Movement Planning

Movement to the assembly areas in the Ardennes was mainly by rail. The deception and secrecy plan called for trains to hide in tunnels during the day to avoid detection. This resulted in roughly ten hours a day of unavailable time and reduced useable time of trains by one-half. Trains would arrive at night in assembly areas, detrain, and return for another load before daylight. Air-raid sirens were employed in detraining sites. When Allied aircraft were sighted, trains were moved to hide in tunnels. These plans proved very effective. German losses to Allied air attack amounted to only eight railcars of ammunition in September, eleven cars of ammunition and rations in October, and four railcars of gasoline in November. In September and October, the assembly areas received nearly 100,000 railcars with 144,735 tons of supplies. November saw nearly 4,000 railcars of ammunition, fuel, rations, horses, weapons and equipment delivered. Most of the cars received in November were units and their equipment. The supplies buildup occurred mainly in September and October.⁴⁵ Approximately 400 empty trains with 22,000 carloads were on standby at any time to move troops and supplies. There were approximately 80 different types of rail cars to haul equipment. This caused difficulties in organizing trains to move the newly formed units that contained a variety of equipment.⁴⁶

The rail movement of the first wave was completed on 10 December. Movement of units designated for the offensive is shown in Appendix C. Units that were involved in

the offensive that are not listed were already in the area or marched to the area. As shown from the table, movement for the offensive units did not begin until 28 October-- over a month since the plan was conceived and less than one month from the original start date. To give an overall perspective of the magnitude of the movement of forces, Figure A provides the German Order of Battle as of 16 December 1944.

Although movement would be completed by 10 December, it was estimated that it would take an additional six days to move units and troops into their initial battle positions. This was executed as planned and without much interference from Allied air, since the weather was foggy and cloudy. Sixth Army used detraining stations in the Cologne-Bonn-Euskirchen area while Fifth Army used stations at Wittlich and Trier.⁴⁷

Until 16 December, all detraining took place between Muenchen-Gladbach and Trier. After the offensive started, detraining had to be conducted east of the Rhine due to Allied air attacks.⁴⁸ Once troops arrived in detraining stations, they moved forward to their assembly areas by foot. Units often used either horse or manpower to move artillery into position instead of vehicles to prevent noise detection. Most units did not move to their initial positions until the night before the offensive. In some cases, units conducted as many as five consecutive night marches. This created the problem in that soldiers and leaders were unfamiliar with the terrain because they arrived without time to conduct reconnaissance.

Once in the assembly area, units were unable to use their radios. This forced them to use couriers. Reconnaissance patrols and artillery activity were restricted. The Germans developed strict methods of traffic control. Many roads were designated one way with control officers at intersections. The secrecy plan also hindered support efforts.

Tank maintenance facilities were not brought into the area until 14 December because Gen Horst Stumpff, commander of Tank Maintenance units, was not informed of the offensive until 13 December. Of significance, there were six tank maintenance companies and one evacuation company for maintenance and recovery support for the offensive.⁴⁹

The buildup plan called for the majority of equipment and troops to be moved to the assembly areas by rail. However, in September, supplies, fuel and ammunition could only be moved by rail as far as the Rhine. Rail lines west of the Rhine were damaged and repairs were prioritized to particular lines. Fortunately for the Germans, the railroads west of the Rhine were built, designed, and located with military use in mind. The lines were built during World War I and improved for the 1940 offensive into France.⁵⁰

The limited amount of bridging equipment meant that units had to capture bridges intact for the assault to be successful. Two of the supporting operations were designed to negate some of the shortages. "Operation Grief" under the command of Colonel Otto Skorzeny's and his 150th Panzer Escort Brigade and Colonel Dr. von der Heyte's 6th Parachute Regiment were given the mission of capturing bridges in the assault sector. When planning for the advance routes for the offensive, German surveillance planes conducted reconnaissance over the area specifically to report on the condition of bridges. However, trees and cover prevented reporting the condition on some bridges. However, pictures did not often provide a clear status of the bridges. At a meeting on 23 November, General Sepp Dietrich, Commander Sixth Panzer Army, and Major Herbert Buechs, Luftwaffe aid to Gen Jodl, had a disagreement on the condition of bridges over the Meuse. Dietrich had information that the bridges were usable and planned to cross

the bridges. Buechs had recent photographs that showed the bridges destroyed.⁵¹ To protect any usable bridges and river crossings, Hitler directed the Luftwaffe to bring forward all available motorized heavy and light AA battalions to the front and protect captured bridges against Allied air attack once the weather broke.⁵² To further complicate matters, as German units were recently retreating through the area, some units destroyed bridges and did not report it to higher headquarters. This is another problem with the secrecy plan. If units had known they were going to attack through the Ardennes, they could have done some internal intelligence or ensured that information was reported higher on bridges and routes. In some cases, German planners were planning on crossing bridges that in reality were no longer trafficable for armor. Based on the number of bridges required and the lack of engineer equipment, plans were designed to give the Panzer armies a more westerly route in the north to minimize their being cut off by a lack of sufficient crossings.⁵³ Finally, roadblocks that were part of the West Wall defenses had to be removed in those sectors where the initial armored penetrations would be made. But due to the deception and secrecy plan, these could not be removed until the night before the assault to prevent units from taking wrong turns and going into American lines.⁵⁴

There were three threats to the German movement plan: (1) Allied air reconnaissance over the Eifel rail approaches; (2) bombing of Rhine bridges; (3) and road and rail cutting that was greater than repair capacity. Allied changes in strategic bombing priorities in October to oil production facilities aided the Germans in overcoming these challenges.⁵⁵

Despite the constant Allied air attacks, the vast majority of unit rail movements occurred without interruption. The German rail system was the most efficient in the world and was completely militarized. Many units came from Poland, Austria, the Netherlands, Denmark and Norway. Fuel and ammunition had to be hauled across the exposed Rhine bridges and unloaded quickly and quietly at the Eifel supply dumps. Bridges over the Rhine were repaired to support the heavy traffic crossing towards the Ardennes buildup area. Only 27 of over 950 divisional-size trains were attacked by Allied air and resulted in a one to two day delay. The most notable rail disruption occurred on 10 and 11 December, when Allied air bombed the Koblenz rail yards that left over 100 bomb craters. However, preplanning and organization of rail repair activities had the rail yards operating at full capacity 24 hours after the attack. The rail line supporting Sixth Panzer Army was damaged on 11 December but was operating again on 12 December. In November, the Allies shifted their bombing priorities to transportation centers and assets. During December, Allied bombers caused over 125 breaks in the rail system feeding the Western Front of which 60 were in the built-up area. German repair engineers, still working on road and rail cuts caused in November, were able to repair 150 cuts with over 100 being within the buildup area.⁵⁶

German planners shipped most supplies by spur and branch lines since Allied bombers concentrated on main lines. On double main lines, the shipments went one way – detrained and turned the other direction for reloading. There were four major supply detraining stations: Rheinbach, Mechernich, Muesch, and Kall. The main troop detraining stations were Schleiden, Stadtkyll, Pruem, Neiderweiss, Trier, and Konz. From 9 Sept to 15 December, main concentration areas received 144,735 tons of supplies.

With the massive amount of traffic, the rail net did not become saturated until 17 December and supplies and trains moved with relative ease.⁵⁷

Lieutenant General Rudolf Gercke, Chief of Transportation, was given the task to deal with the Rhine River crossing sites. This was top priority from September to October. Bridges were supported to prevent single bombs from completely destroying a bridge. Allied bombs hit two Rhine River bridges in November, while another four were under repair from attacks in October. However, at each bridge, at least one rail line remained operational. Ferries were modified to carry trains and highway bridges were strengthened and laid with rail in case rail bridges were damaged. Spans of military bridges were prepositioned on the Rhine for immediate use if needed. The Germans even had plans to tunnel under the Rhine for troop movements, but time was too short for such a construction project.⁵⁸

Section VIII. Buildup and Reorganization of Units

Since the Seventh Army was already in the sector, it was given the mission of conducting all of the reception for units moving into the area for the offensive. Seventh Army assumed responsibility for movements, billeting, supply, and camouflage. The Seventh Army maintained this mission until 10 December, when Fifth and Sixth Armies took command of their own sectors.⁵⁹

As mentioned, not all went well with the units designated for the offensive. In October, the Allies resumed attacks in the Aachen sector. The 3rd Panzer Grenadier, 116th Panzer Grenadier, and the 12th Volks Grenadier Divisions were unable to withdraw for refitting. The 9th Panzer and 15th Panzer Grenadier Divisions were committed in a local counterattack operation to relieve the Fifteenth Army. The 2nd

Panzer Division withdrew for refitting on 20 October. The 11th Panzer Division could not be released from Army Group G to the South and the 256th Volks Grenadier Division, designated for the offensive, was committed to Fifteenth Army. The 269th Infantry Division from Norway arrived in sector but had to be released to Army Group G in the Vosges to counter Allied attacks in that sector.⁶⁰ The 2nd and 6th SS Mountain Divisions marched 1200 kilometers from Finland but did not arrive in time for the start of the offensive.⁶¹ The 11th Panzer and 17th SS Panzer Grenadier Division also did not arrive in time for the start of the offensive.⁶² Of note, in the original plan, the 11th Panzer and 17th SS Panzer Divisions were designated to capture Bastogne on 17 December. Lieutenant General Manteuffel, commander of the German Fifth Panzer Army, assigned the capture of Bastogne to the 26th Volks Grenadier Division after realizing that the two original units would be unavailable.⁶³ Upon arrival, the 2nd Mountain Division, 10th SS Panzer, and 11th Panzer Divisions were relocated to Nineteenth Army to take place in "Operation Northwind" planned for January.⁶⁴ By the end of October, no significant refitting of planned divisions was conducted. Meanwhile, OKW removed two of three divisions dedicated to the offensive and employed them on other frontal sectors to prevent Allied breakthroughs that might uncover the buildup.⁶⁵ Some divisions were committed without their full complement of units and the 2nd and 9th SS Panzer Divisions had only been in position a few hours before the start of the offensive and some of their units had not yet arrived.⁶⁶

Some of the movements went as planned. The 3rd and 15th Panzer Grenadier Divisions arrived from Italy by rail at the end of August and later designated for the offensive. By 28 October, the movement of the Volks Artillery Corps and Volkswerber

brigades began as planned.⁶⁷ Several assault gun battalions, the Fuehrer Grenadier Brigade and the Fuehrer Escort Brigade, and the 2nd and 6th Mountain Divisions were transferred from the Eastern Front for use in the offensive during the build up period.⁶⁸ Both the Fuehrer Escort and Fuehrer Grenadier Brigades arrived as brigades but were expanded into division size units. There were still problems since the Fuehrer Escort brigade had no supply trains and received its supplies from an adjacent division.⁶⁹

Despite the lack of progress in preparations, Hitler remained committed to the plan. On 3 November, Field Marshall von Rundstedt stated he believed he could finish all preparations for the offensive by 25 November but that was dependent on the Allies launching a counterattack.⁷⁰

On 15 December, eight Panzer and 13 Infantry Divisions of all types had deployed to the assault areas.⁷¹ There were also three infantry divisions and one Panzer division in reserve. This total would be five divisions short of the required thirty divisions that Hitler directed in September. Infantry divisions varied from 8,000 to 17,000 personnel. The Panzer Grenadier divisions were at the high end of that scale. Paratrooper division strength was between 15,000 and 18,000 men.⁷²

The reorganization of units was proceeding as planned, but some necessary equipment was not available to fill all requirements. Panzer units were to be brought off the line for short-term refitting before the offensive. New authorizations gave SS Panzer divisions 90-100 tanks, 15,000 to 18,000 men and two additional independent tank battalions with ninety tanks each. The Army Panzer divisions were only fielded to 70 to 80 percent with about sixty to seventy tanks, 11,000 to 13,000 men and one additional

Panzer brigade with 100 tanks. The SS units had 80 to 100 percent of their authorized personnel and equipment while other units only received 50 to 60 percent strength.⁷³

Motorized vehicle transport was a problem everywhere. Primary movers were short and horse drawn carriages were used to supplement motorized units. The Raupenschlepper Ost (a full-track vehicle capable of carrying six tons) was available but the towing capability was insufficient to pull artillery guns up the snow covered hills of the Ardennes. Tracked vehicles capable of cross-country travel were limited, as were tank recovery vehicles. Transportation was so limited that some artillery units could only move one battery at a time.⁷⁴

Engineer units throughout the German Army were understrength in personnel and equipment. Many units were lacking power tools or transport. The Germans relied on the "Organization Todt" to assist with engineer tasks.⁷⁵ This organization was a civilian organization that did contract work for the military. They could be thought of a German version of Brown and Root Contractors. Motorized units were provided with specialized engineer assets to help them over cratered roads and clear obstacles. However, these engineer assets were limited in amounts.⁷⁶

Section IX. Status of Supply Buildup

Delivery of supplies was a continuous problem. At meetings in early and late November, commanders at all levels were complaining about the delays and lack of required and requested equipment and supplies.⁷⁷ As late as 23 November, commanders were concerned about fuel and ammunition shortages. General Jodl requested delays in the start date because they were not ready. Troops and supplies had not arrived. The

entire Sixth Panzer Army and some Volks Grenadier Divisions and transportation facilities were not ready.⁷⁸

Fuel was the single biggest problem for logistics planners for the offensive. Fuel tracking was the largest and most detailed tracked supply in the last few weeks before the offensive. OKW planners calculated that five units (basic load) of fuel were required to conduct the offensive. A unit was the amount necessary to move a vehicle 100km. However, in the terrain and climate of the Ardennes, a unit would only move a vehicle an estimated 50 km. The required amount was based on a planning factor of 260,000 gallons per day for three armies in the offensive. However, the Army Group B quartermaster planners calculated that the maneuver units would consume four times that much fuel based on the terrain and weather conditions in the Ardennes.⁷⁹

Despite many problems and difficulties, OKW compiled the required 4.68 million gallons (14 million tons) necessary to sustain the offensive to Antwerp. However, at the beginning of the offensive only one to two basic loads on average were available across OB-West. This amount of fuel would only move units 50-100 km--well short of the objective of Antwerp. The remainder of the fuel was to be delivered to forces from stocks east of the Rhine once bridges were secured over the Meuse.⁸⁰ Priority was given to ensure SS units had their full compliment of fuel.⁸¹ However, regular Panzer divisions had enough fuel to go 150-200 km in normal terrain, but the Ardennes could not be described a normal terrain.⁸²

Resupply and movement of fuel was organized at division level. It was standard procedure to keep fuel resupply organizations toward the front of formations to avoid delays. Stockage of fuel was not a significant factor. The Wehrmacht planned on 20,000

tons for the operation: 8,000 tons to reach the Meuse, 8,000 to carry the divisions to Antwerp and 4,000 in reserve.⁸³

Division commanders were unhappy with the amount of fuel provided and issued orders to capture Allied fuel dumps where possible. As with ammo stocks, fuel stocks were kept off the main road and rail networks to prevent them from being hit by errant Allied bombs aimed at the transportation network.⁸⁴

Ammunition was the second biggest issue for commanders during the buildup. Army Group B planners estimated 1,200 tons of ammunition would be expended daily during the offensive. This planning was based on rapid movements once penetration was accomplished. To meet this goal, Lieutenant General Alfred Toppe, Quartermaster Army Group B, planned on delivering four basic loads to units – two for the units after the offensive started, one-half for the breakthrough, one-half to keep the offensive rolling and one for the artillery preparation. However, Allied attacks before the offensive consumed some ammunition. In the end, units had one and-one-half basic loads for the offensive after the artillery prep. The amount of ammunition provided was sufficient. As of 13 December, Army Group B had 15,000 tons of ammunition in supply dumps. This does not include ammunition already provided to units that were moving to their battle positions. Antiaircraft artillery was the major beneficiary for the attack. AAA ammunition was provided in large amounts to counter expected Allied air attacks once the weather improved and favored Allied air forces.⁸⁵

To ensure sufficient stocks of artillery ammunition, Army Group B placed strict limitations on the expenditure of light and medium artillery. These restrictions were so strict that quiet sectors along the front only had a few rounds a day while units in the

Ardennes sector were being loaded with stocks. The III Flak Corps, with 66 heavy and 74 medium and light batteries, had 7 basic loads of ammunition.⁸⁶ This proved to be a burden since the units did not have the transportation assets to move this large amount of ammunition once the offensive started. Similar to the movement of artillery, second echelon units were established to transport ammunition for these special gun units.⁸⁷ However, on 15 December, OB West only had an average of one and one-half basic loads with Army Group B guns with another two basic loads promised.⁸⁸ However, there was a shortage of rocket ammunition for the Werfer units and 105- and 150-millimeter field howitzers. Maneuver units were only provided two complete basic loads. Sixth Panzer Army requested 12 to 15 basic loads of artillery ammunition for the first ten days of the offensive. OBW had a reserve of half a basic load in depots around Koblenz and Cologne and a separate reserve of 30 trainloads with 500 tons per train to be moved forward after units crossed the Meuse.⁸⁹

The greatest unknown factor in ammunition planning and buildup was the disruption of rail movements. To counter this, ammunition was allocated in proportions. Space was so constrained on trains that to save space in loading trains, logisticians did not ship flash eliminator wads. Organizations were issued over the standard 20 percent of additional charges to ensure the artillery would be able to range far behind enemy lines to hit their headquarters and keep pace with the infantry before having to displace.⁹⁰

There were several areas that caused shortages with ammunition for the offensive. First, very few leaders knew of the plan until one or two days before the beginning of the offensive. Secondly, units did not know their locations or targets until one or two days before they were to fire. Next, barriers were put up on roads to prevent vehicles from

moving forward. This prevented ammunition supply units from pre-positioning requested ammunition in locations to support the offensive.⁹¹ Furthermore, ammo stocks were maintained off the main road and rail networks to prevent them from being hit by errant Allied bombs aimed at the transportation network.

Finally, there were many calibers of German artillery. German units had ten sizes of artillery plus the different types of artillery captured from other countries being reutilized. This caused great problems: (1) units were delivered incorrect amounts of ammunition; (2) units could not be found to deliver ammunition; (3) units were delivered incorrect calibers of ammunition. Volks Artillery Groups suffered from shortages of ammunition and transportation.⁹² Problems occurred when specialized caliber guns were being brought into an area. The special ammunition for these weapons had to be specially handled and transported quickly since these units generally did not carry any ammunition with them.⁹³

Section X. Movement of Units to Assembly Areas

Starting on 13 December, units not already on line began movement forward to the battle positions. During this timeframe, all roads, even the narrowest, were limited to one way traffic during the hours of darkness. This was so strict that not even a general could travel in an opposite direction of traffic. During daylight hours, units were halted and dispersed in the woods.⁹⁴

Units moved forward into designated areas where activity was limited. On the night of 14 December, units began movement into Area I. Area I was the area designated for units to move on the first night. Armored divisions moved to within fifteen kilometers of their starting firing positions. Infantry division moved within five to eight kilometers

behind the front. Rocket projector units moved to hidden positions immediately behind their battle positions. Army controlled artillery and antiaircraft artillery were also brought forward. Horses were used to move equipment and vehicles. During the night of 15 December, units moved to Area II, the area just behind their initial assault positions approximately one to two kilometers from the American lines.⁹⁵ Most motorized units moved forward while low-flying planes were used to drown out the sound of the vehicles while other units were drawn by horses. Artillery and rocket units were finally able to dig in their positions. This late movement and poor coordination between units resulted in many units trying to occupy the same location. This primarily occurred with artillery, antiaircraft artillery, searchlights, and rocket units.⁹⁶ Wheeled units then moved into the vacant Area I and armor units moved into designated armor areas. All movements occurred at night over designated roads without lights. All roads within the movement areas were designated one way to speed movement. Some roads were designated "east" movement only roads to allow for traffic moving to the rear areas. In no case did any unit move more than fifty kilometers miles during either of the two previous nights. On all the major routes, repair and recovery shops were established to assist mechanized transport that broke down. During the night of 15 December, all units moved into their final assault positions.⁹⁷

Some units used horse transport to move motorized units and artillery into position. However, this had several disadvantages and was not used by other units. Horse transport units had trouble linking up with units that requested transport. Also, the number of horses was limited and this limited the number of items that could be moved. Although horses could move vehicles and other equipment, once the horse teams

delivered the items to their destination, there was difficulty in moving the horse teams back for more equipment due to the one-way traffic rules. Additionally, often horse teams did not have the required harnesses or limbers to fit the guns of motorized units.⁹⁸

Heavy artillery could not be moved by horse and had to be moved by motor transport because they had little or no traction at all. Towing echelons of twelve and eighteen ton tractors were set up by Army Group B and corps for the purpose of towing the heavy guns. These echelons transported many of the heavy guns of the Volks Artillery Corps from the railhead to the firing positions. The tractors were taken from several of the Panzer divisions assigned to the offensive. The divisions did not like Army Group B taking their movement assets because these tractors were overused, resulting in their breakdown and not being available during the offensive.⁹⁹

Overall, the movement to the assembly areas was successful despite many problems. Artillery and armor units were moved without detection by American. Stocks of supplies were stockpiled in areas without much disruption. However, the shortage of towing vehicles would prevent much of the artillery and supplies from moving forward after the start of the assault.

Section XI. Status of Units at start of Offensive

Sixth Panzer Army

Preparations for Sixth Panzer Army began at the end of September when the 1st, 2nd, 9th and 12th SS Panzer Divisions and Panzer Lehr Division withdrew east to the Rhine for refreshing. On 6 November, the Sixth Army began movement to the assembly areas despite army protests that refitting was not properly completed. There was

considerable concern that units still in contact would not be able to withdraw and be positioned in time for the start of the offensive.¹⁰⁰

Their assembly area was in the Cologne-Rheydt-Juelish-Durren-Muenstrereifel-Ahrweiler-Sonn area. This large movement went according to plan despite strong Allied air attacks. Units located in the Eifel were still in contact with the enemy and took longer to displace. This caused problems in refitting and retraining these units. These units were also moved over long periods on the roads and a shortage of fuel created more difficulties in reorganizing Sixth Army. Sixth Panzer Army SS units were to be replenished 100 percent in material and personnel.¹⁰¹

A battalion of the new Jagdtigers was assigned to protect the northern flank of the Sixth Army. This battalion had twenty-one of these super-heavy tanks. They were to be used in conjunction with Colonel von der Heyte's paratrooper regiment to block roads and prevent American units from influencing Sixth Army. The Jagdtiger weighed seventy-two tons with a 128-millimeter main gun mounted on a Tiger II chassis. However, these units did not arrive in time to start the offensive due to transportation problems east of the Rhine.¹⁰²

In the Sixth Army sector, the plan was for first echelon armored divisions to occupy bridges and for supplies to be brought up with second echelon units. Lieutenant General Hitzfeld, Commander LXVII Corps, stated that fuel and supply systems were working properly during the preparations for the attack. However, concerning fuel, his orders did depend on the capture of Allied fuel.¹⁰³

Army Group B assigned the 3rd Panzer Grenadier Division to the Sixth Panzer Army just before the start of the offensive. It had been involved in heavy fighting in the

Aachen area and had not been reorganized or reequipped. At the time of the initial assault, the division had several understrength units with little equipment and material.¹⁰⁴

The 9th SS Panzer Division was the weakest of the Panzer divisions. It was insufficiently equipped with vehicles and this required most of the division to travel on foot. Most of the soldiers were "Volksdeustch." These are ethnic Germans from conquered lands like Poland. Other Panzer divisions received replacements from the Luftwaffe and Navy.¹⁰⁵

Other units that had time to reorganize were well equipped. The 1st SS Panzer Regiment, Kampfgruppe (Combat Group) Peiper, (KG Peiper) of 1st SS Panzer Division completed a reorganization of two months and received 3,500 new combat troops and new tanks direct from the assembly line. However, the number of tanks was below authorization. To make up the shortage of tanks, I SS Panzer Corps gave KG Peiper a battalion of Tiger tanks. This gave him one battalion of mixed Panther and Tiger tanks, one battalion of Tiger tanks and one SS tank battalion without tanks. KG Peiper began movement to the assembly area on 13 December. At a conference on 14 December, 1st SS Panzer Div outlined the plan to commanders. Colonel Peiper complained that the designated routes were insufficient for tanks and were suited for bicycles. He was overruled since Hitler stated that the routes were to be strictly followed. To enhance movement, Peiper formed his units into 25 km columns. Since vehicles could not pass on the roads, combat vehicles were placed up front. Unfortunately, Peiper placed his supply and engineer units in the center and rear of the columns.¹⁰⁶ The artillery assigned to KG Peiper did not receive enough fuel and was recalled to division. KG Peiper had sufficient ammunition to last four or five days.¹⁰⁷

The 12th Panzer Division (Hitler Youth) was not organized to conduct an assault. The unit was insufficiently equipped and could not conduct effective operations with the forces available. It only had one reconnaissance battalion with one company that consisted of only one rifle company. Vehicle strength was only 75 percent at the start of the offensive. The supply units had only 50 percent of the authorized vehicles and could only carry 300 tons of supplies--less than 50 percent of the authorized capacity.¹⁰⁸

Furthermore, the two trains of fuel promised Sixth Army had not arrived and orders were given to capture as much fuel as possible. The constant arrival of vehicles and equipment interfered with the training of units. A lack of fuel and vehicles also inhibited the training of units. Sixth Army planned to conduct an intense half-hour artillery preparation along their entire front before the attack. However, the ammunition on hand was one and a half units for assault units and artillery and was insufficient to support the artillery preparation. One and one-half units of fuel was available with one additional unit brought up with great difficulty on the day of the assault.¹⁰⁹

XLVII Corps had to overcome difficulties with long road marches due to lack of vehicles. Vehicles had difficulty with the long road marches and were constantly breaking down. The roads were hilly, icy, wet, muddy, and the ground was like a soggy swamp. Strict and economical use of fuel limited training and movements. Some units within the corps were insufficiently organized and equipped. The 326th Volks Grenadier Division only had one infantry regiment because of losses in personnel and lack of equipment. Despite many difficulties, ammunition was in good supply across the corps and only the Rocket Artillery Brigade had to ration ammunition.¹¹⁰

Overall, the divisions in Sixth Army were at full strength on personnel and approximately 80 to 90 percent on equipment. During reorganization, the 1 SS Panzer Corps received 250 new tanks.¹¹¹ Ammunition was sufficient for eight days with eight more days in dumps or on rail cars. Fuel was available for only 200 km (four basic loads). However, half of it was east of the Rhine. It was planned that one unit per day would be delivered to units if there were additional transportation difficulties. The travel restrictions caused by expected air interdiction and the location of the supply depots meant that it was normal for supplies to take two to three days for delivery.¹¹²

Planners used planes to reconnoiter assault routes to try and make the best use of limited routes. The Allies unintentionally did make planning easier for the Germans. German intelligence units intercepted US military police unsecured radio transmissions and were able to determine which roads were trafficable and which bridges were intact.¹¹³

Horses were used to bring up artillery and equipment to the initial assault positions. Motor vehicles were 80 percent available. Replacement vehicles were made up of many captured and civilian vehicles.¹¹⁴ Artillery ammunition supplies were never received in sufficient amounts. Sixth Army was promised fourteen days of supply but only received ten days. Supply dumps were located east of the Rhine near Bonn. Artillery did not receive enough fuel. This shortage, along with clogged roads prevented the artillery from moving forward with the assault.¹¹⁵

On 16 December, only one basic load of ammunition was on hand with assault units. Artillery units had only one and a half units. Seven days food supply was on hand. Sixth Army had 500 tanks but 100 were deadlined due to mechanical failures during the three day march to the initial assault positions.¹¹⁶

Overall, Sixth Panzer Army was sufficient readiness to conduct an offensive. They received priority fill of equipment, supplies, and personnel. However, they had the most difficult terrain to cross during the offensive and this would hinder their progress. Their movement to the area was mostly completed and units were committed fully. A main terrain problem was the very limited number of access routes into the battle zone. On the night of 15 December, Sixth Army units stretched on four major avenues of attack for over twenty kilometers.

Fifth Panzer Army

The Fifth Army plan was similar to the Sixth Army's. The first echelon armored divisions would occupy bridges and supplies would be brought up with second echelon units. The Sixth Army Commander did not want armored units to be held up in their advance. They were to bypass large towns and not employ defensively against Allied counterattacks.¹¹⁷ Concerning bridgeheads, the Fifth Army was not limited to its sector to cross the Meuse. The Army began assembly on 26 November but some of its armor and artillery was coming from as far north as Muenchen-Gladbach. One attack division, 116th Panzer Div would not complete detraining until 16 December.¹¹⁸

The 26th Volks Grenadier Division relocated from the front lines in Poland in September. Its reorganization took five weeks. It arrived in the West Wall in early November. The division reduced equipment and supply vehicles to a minimum in order to keep the troops mobile in the Ardennes. All available space on vehicles was used to transport fuel and ammunition. The reorganization plan reduced infantry companies to 80 men. Surplus personnel were sent to the division's replacement training battalion where they were allocated to the line units. The Reconnaissance Battalion, that was

authorized bicycles, was given motor transport in an effort to ensure rapid mobility in the Ardennes area. However, all of their artillery was horse-drawn.¹¹⁹

The XLVII Corps used horses to bring artillery and ammunition to the front. The XLVII Corps was organized at approximately 80 percent of their T/O strength. Planners estimated that each unit should carry five units (basic loads) because of the terrain and weather. However, only two units of fuel were onhand before the offensive.

Ammunition and food were generally sufficient. The plan was for supplies to be brought up by trucks once the offensive started.¹²⁰

General Manteuffel insisted on a several areas before the offensive started. He demanded sufficient stocks of fuel and ammunition, sufficient air support to support the ground forces, complete reorganization of Panzer divisions and artillery units, and auxiliary traffic control to supplement the engineers that would be required for bridging tasks.¹²¹ The Panzer divisions had approximately sixty to seventy tanks each including assault guns. The Panzer Lehr Division added another 100 tanks and assault guns.

General Manteuffel, probably the most capable commander left in the West, directed specific movement orders to his subordinate commanders. He directed that no passing would occur on the roads and that motorized units were to select only the most capable "Eifel" vehicles in the area--even if from civilians. He used his military police to direct traffic on the roads.¹²² Fifth Army only received one and a half units of fuel. The rest was to be brought up during the offensive. As a result, General Manteuffel realized they would be unable to bring forward the artillery and rocket projectors after the offensive started.¹²³

The following bridging assets were available to Fifth Panzer Army: LXVI Corps had two columns, LVIII Panzer Corps has one and a half pontoon columns, XLVII Panzer Corps had one engineer and one pontoon column. Additionally, 2nd Panzer Division and the Panzer Training Division had an additional motor vehicle column each. Sufficient lumber for construction of bridges was made available to avoid use of the bridging equipment units at the Our or Clerf Rivers crossings. Engineer units were directed to save the use of their equipment for crossings over the Ourthe River and, most important, over the Meuse River. The transportation of the lumber for the emergency bridges caused difficulties because of a lack of spare trucks. A solution was found by unloading bridge columns and hauling the lumber to the sites where emergency bridges would be built after the assault. Then the bridging equipment would be uploaded and prepared for the assault.¹²⁴

Fifth Army also relied heavily upon the Organization Todt (OT) to move equipment up to the initial battle positions. This allowed the assault vehicles to save fuel for use in the offensive. The OT pulled vehicles to positions, recovered stuck vehicles, moved up bridging equipment, pulled equipment up hills and generally assisted in movement from the autobahn.¹²⁵

Due to lack of ammunition and lack of knowledge of American positions, Fifth Army did not use a large artillery preparation. Artillery fired on known American positions and artillery batteries.¹²⁶

Units within Fifth Army were in different states of readiness. One of the most unprepared units was the 116th Panzer Division. The 116th Panzer Div was a very proud unit with a good reputation in battle. However, the unit was reorganized with over 75

percent new personnel replacements but maintained ninety-two Mark V and forty-seven Mark IV tanks. Furthermore, the unit was missing 40 percent of their organic transport vehicles.¹²⁷ The engineer battalion only had enough equipment and personnel for two companies. Its old vehicles were in poor condition and were short of spare parts.¹²⁸

The 560 Volks Grenadier Division had not yet arrived from Denmark with all of its units. One of two infantry regiments, the antitank units, and one engineer company had not yet arrived. The missing units would not arrive in time to start the offensive and were committed on 22 December.¹²⁹

Overall, Fifth Panzer Army was in condition to support an attack with their forward echelon units. However, their second echelon units were insufficiently manned, equipped and trained to sustain the flanks and protect supply lines. Fifth Panzer Army did not receive sufficient ammunition or fuel to support an attack over the distance required and against the best American divisions in the sector.

Seventh Army Sector

Seventh Army was the weakest and received the smallest allocation of artillery and armored support due to it being third on the army priority list.¹³⁰ The terrain in the Seventh Army sector was also the worst terrain in the offensive area. There were many steep hills and curvy roads that were frozen over in early December. To make movement on roads a little more difficult, over-enthusiastic local civilians had installed obstacles to prevent Allied invasion and protect the buildup. These were not wide enough to allow movement of vehicles between them and prevented vehicle movement until they were removed.¹³¹ The most significant terrain features were the Sauer and Our Rivers with steep banks and limited crossing sites. They were fordable but with great difficulty. To

increase the difficulty, the rivers were swollen by melting snow and jammed with ice packs. Planners calculated that one bridge column company was required for each crossing of the Our River and two per crossing of the Sauer River. One treadway bridge, two foot bridges and one tank bridge were required per division.¹³² The Seventh Army only had pontoon bridges. One division had two large pontoon bridges, but one was destroyed by fire at the first crossing attempt.¹³³

On 14 December, most divisions were on line in attack positions, but some were repositioning due to last minute changes. Seventh Army was originally assigned five divisions for the offensive. However, as the buildup progressed, Army Group B assigned and reassigned units from Seventh Army changed seven times from 10 November until the final date. Their bridging columns had been detrained east of the Rhine without any transportation to move them to the Ardennes. Artillery did not have prime movers. This would hamper their ability to carry ammunition after the start of the offensive.¹³⁴

The assault divisions were placed in positions with infantry units in front and motorized units toward the rear. There were many differences between what was requested, promised and provided. Seventh Army requested at least four engineer bridge construction battalions and from six to eight bridge columns with at least one being for tanks. OB West promised one engineer bridge battalion and two Organization Todt battalions, and six bridge columns with 100 large rubber pontoons.¹³⁵ On 12 December, the engineer brigade consisting of two battalions arrived. They were well-trained in obstacle construction but had no training in bridge construction. On 14 December, General Brandenberger complained to General Jodl that the extreme shortage of bridging equipment would threaten the accomplishment of the mission. The Organization Todt

brigade and the bridge columns still had not arrived as of 16 December due to transportation shortages west of the Rhine. The Organization Todt Brigade units finally arrived on 17 or 18 December and only two of the six bridge columns arrived shortly before Christmas.¹³⁶

Transportation of equipment was difficult due to a shortage of transport assets. Army Group B stripped Seventh Army of a considerable part of their transportation assets to provide to the Sixth Army. This reduced Seventh Army to a bare minimum of assets to haul supplies. The transportation assets of the attached artillery units were used to transport equipment and supplies for the entire Army.¹³⁷

Based on the mission outlined for Seventh Army, the General Brandenberger requested a generous supply of ammunition and vehicles to support the mobile defense. However, Hitler refused his requests. Supplies that were received were stored in various storage dumps in rear areas to protect them being detected by Allied air forces. The major shortfalls were bridging and ferry equipment. Supplies were moved up to the initial position in the final four to five days. It was forbidden to move supplies within ten km of the front with motor vehicles. All supplies were then moved by horse transport or by means of manpower in bearer columns--notably ammunition to artillery positions. Guns and artillery were towed to initial positions. Straw and cloth were used to silence the noise of the movement of the horses and vehicle tires.¹³⁸

The 212th Volks Grenadier Division was the only division in the Seventh Army with assault guns. However, it only had five functional guns since the others were damaged and had not been replaced. Other factors degraded the ability of this division to accomplish its mission. Primarily, the division was primarily a horse-drawn division.

The engineer unit had no ferry equipment to assist in bridge crossings. The unit was at full strength of T/O equipment. Each division was ordered to have two advanced detachments; however, only one existed in the 212 Volks Grenadier Division due to vehicle shortages.¹³⁹

The 5th Parachute Division was probably in the worst shape of any of the five divisions. The commander rated them a Level IV (equivalent to a USR C-4 rating) unit only capable of a "qualified defense." The unit was missing much of their radio, winter clothing, mortars, antitank guns.¹⁴⁰ Their fuel shortage was so bad that their vehicles were moved by manpower as often as possible. Their engineer company could not build bridges and only enough material for one pontoon bridge was provided. However, the unit was not trained in its use.¹⁴¹ The artillery lacked prime movers. The supply unit had not arrived by the time of the offensive because the Parachute Army had transferred it to another unit. To make up for the shortage of a supply unit, the division borrowed 100 horse drawn wagons from the farmers in the Bitburg area.¹⁴² The rear services that were present were poorly trained and the supply system was very difficult. The replacement battalions that contained 1000 men each had no vehicles and were totally immobile.¹⁴³ The antitank battalion lost all of its vehicles to Allied bombing during transport to the assembly area. Likewise, the artillery did not have enough vehicles and was thus immobile. There were only two fully motorized units in the division.¹⁴⁴

Roads in their sector were muddy and this caused difficulty for the heavy infantry weapons. A bridge over the Our was blocked by a crater that could not be filled by engineers since it could be seen by American troops. An emergency bridge was to be built at the start of the offensive but would not be ready until approximately 1400.¹⁴⁵

Appendix D contains an analysis of each division and corps asset within Seventh Army before the start of the offensive.

Seventh Army was given the mission of protecting the flank of the offensive but no significant effort was made to provide them the assets to accomplish the mission. Most units were dismounted, insufficiently trained, had insufficient leadership, insufficient bridging equipment, and had insufficient fuel and ammunition to fight much past the front lines. Seventh Army also had the worst terrain of all three armies with three different rivers to cross in their assault sector. Seventh Army is an excellent example of a unit destined to fail their assigned mission.

Section XII. Final Assessment and Conclusion

By 15 December, Germany had assembled a formidable force of thirteen infantry, two airborne units, and nine Panzer divisions. Another three infantry divisions and one Panzer division were added after the offensive began. This force included 300,000 men, 1,900 pieces of artillery, and 970 tanks and assault guns with another 450 tanks and guns in the reserve force. Antiaircraft and rocket projector units totaled 7,822 weapon systems. This formation gave the Germans a 2:1 ratio in manpower and 3:1 in tanks and assault guns.¹⁴⁶

Although Germany amassed a formidable force on paper, there were significant shortcomings. Motor transportation was lacking across the force. The best-equipped units only had 80 percent of their authorized vehicles with the remaining units averaging 50 percent. One of the best-mechanized units had sixty different types of transportation vehicles. Spare parts, a necessity in cold climates and with numerous types of equipment, hardly existed. Prime movers and tank recovery vehicles were in limited

supply. The same was true for engineer equipment and vehicles. Fuel was available just not distributed to the necessary levels and units. Therefore, many units possessed amounts far below the requested amounts in fuel and ammunition stocks. All of these factors would contribute to the failure of the offensive.

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³Ibid., 61.

⁴Ibid., 62.

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¹¹Ibid., 52.

¹²Ibid., 66.

¹³Ibid., 70

¹⁴Ibid., 44.

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¹⁸Wesley Craven and James Cate, eds., *The Army Air Forces in World War II* (Chicago: University of Chicago Press, 1957), 673.

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²⁷Alfred Jodl, "Ardennes Offensive" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, ETHINT-51, July 1945), 14, photocopied.

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²⁹Ibid., 22.

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³¹Ibid., 20.

³²Buechs, MS A-977, 14.

³³William Goolrick and Ogden Tanner, *Battle of the Bulge, World War II* (Alexandria, VA: Time-Life Books, 1979), 21.

³⁴David Irving, *Hitler's War 1942-1945* (Hong Kong: Macmillian Publishers, 1977), 743.

³⁵Roland Gaul, *The Battle of the Bulge in Luxembourg*, vol. 1, *The Germans* (Atglen, PA: Schiffer Military/Aviation History Publishing, 1995), 18.

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³⁸Goolrick, 22.

³⁹James R. Arnold, *Ardennes 1944, Hitler's Last Gamble in the West*, Publication of Osprey Military Series, ed. David G. Chandler, no. 5 (United Kingdom: Osprey Publishing, 1990), 13-20.

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⁷⁴Brandenburger, (A-876), 99.

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⁸⁶Cole, 68.

⁸⁷Rundstedt et al., 18.

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CHAPTER 3

TACTICAL LOGISTICS DURING THE OFFENSIVE

When the guns erupted at 0530 on 16 December to start the Ardennes Offensive, the logistical problems already discussed would begin to manifest themselves. The shortage of ammunition would take a few days to seriously impact the offensive. However, the shortage of fuel and the effects of the terrain and weather would immediately influence the offensive.

The German order of battle had the Sixth Panzer Army on the northern shoulder, Fifth Panzer Army in the center, and the Seventh Army on the southern shoulder. Hitler's three armies stormed across the front and attacked unprepared and shocked American units. The initial phases of the attack were successful. German units quickly disrupted Allied command and control. There was no coordinated defense, but small bands of American GIs fought and held the German advance in many places. All along the front, shocked American units either retreated or stood and fought. The German planners expected the Americans to retreat and not stand and fight against the powerful onslaught. Since surprise was achieved and the Americans were caught off guard and unprepared to direct and defend or counterattack. Furthermore, the cloudy skies prevented any significant Allied air from interdicting German columns or providing close air support.

Section I. Assessment of Move the Force

From the outset of the offensive, the attack was successful but moved slowly. There were many causes for the inability to obtain speed of maneuver. Most significant were inadequate and slow repair and construction of bridges, effects of weather and

terrain, the insufficient road structure, the lack of engineer forces, and affects of Allied air forces. Each of which had an impact on the Germans ability to maintain their attack time frame or maneuver on the battlefield.

The inability to bridge rivers was the most significant problem early in the offensive. Construction of most bridges could not begin until the offensive started without giving away the plan to the Americans. Commanders prepositioned available bridge units at the head of columns and began constructing bridges immediately at 0530.

The Sixth Panzer Army had its share of problems in bridge construction. The Our River currents were stronger than planned due to heavy rain earlier in the week and melting snow. This caused delays in completing bridges capable of supporting the armor of the 2 SS Panzer Division. The bridge was not completed until 1500--six hours later than planned.¹ Only a few small units with light vehicles were ferried across. The lack of armor support prevented the capture of several small towns and key terrain. A bridge over the Clerf River was not completed until the night of 18 December and prevented the majority of Panzer Lehr from crossing that obstacle on schedule. Meanwhile, 9 Panzer Division of II SS Panzer Corps was delayed at a blown bridge at Andler. They advanced dismounted up the steep slopes with ammunition and heavy weapons. The march up the muddy terrain exhausted the troops.²

The inability to build bridges in the Seventh Army sector also inhibited movement. A bridge was to be constructed in the 212 Volks Grenadier Division area but was delayed most of the day because it was constantly harassed by observed American artillery fire. This bridge was unable to be finished and an emergency bridge was constructed forty-eight hours later. This failure to cross the river in accordance with the

time frame prevented heavy armor from supporting 212 Volks Grenadier Division attacks.³ The 212th Volks Grenadier Division was able to construct a footbridge by using house doors, carriages, and scrap wood from the village. A military bridge was planned for the division but was cancelled on 15 December.⁴ Insufficient bridges across the Our River delayed armored support for the 352 Volks Grenadier Division and 5 Parachute Division until late on 17 December. Once vehicles were able to cross the Our River, they were clogged on the steep grades and easily destroyed by American artillery.⁵

The Fifth Panzer Army was able to construct bridges and maneuver forces to overcome difficulties in bridge construction. The 18 Volks Grenadier Division was successful in capturing a bridge undamaged over the Our at Schoenberg on 17 December. The LVIII Corps planned on the use of the bridges at Burg, Reuland, Oberhausen, and two bridges at Ouren. The Corps anticipated these bridges would remain intact since they were needed to resupply the American 28 Infantry Division defending the sector. According to reports, the bridge at Kalborn was destroyed so the corps bridging assets of one engineer column and half a bridge column as well as the emergency bridging equipment were shifted north to support the assault. The 560 Volks Grenadier Division, only partially committed due to some units not yet arrived, captured the two river crossings at Ouren but lost them after a counterattack by American units on 16 December. However, units of the 116 Panzer Division were able to reclaim the bridge crossing sites and the site of the destroyed bridge at Kalborn by evening and crossings continued. This did delay the time schedule of the 560 Volks Grenadier Division and the 116 Panzer Division. To further slow the offensive, the reconstruction of the destroyed Kalborn bridge would be completed by evening of 17 December or early on 18 December

to allow armor units to cross. Therefore, the corps decided to cross the Our River at Ouren and redirected units to Ouren to cross and continue the attack. The 26 Volks Grenadier Division was to cross the division by means of a bridge to be built near Dasburg to establish a bridgehead over the Clerf River at Clerf and move onward to the Meuse at Dinant. Unfortunately, the current made the construction of the bridge at Dasburg very difficult and only a ferry could be used early in the morning of the assault. The ferry could only carry light equipment, motorcycles and a few trucks--heavy weapons were unable to cross. This shortage of heavy weapons caused considerable losses when American units counterattacked later in the day. The Dasburg bridge was finally completed at 1500 by the 26 Volks Grenadier Division engineers using their engineer equipment. However, obstacles built across the road from the bridge by the Germans during their retreat in the Autumn of 1944 caused delays and congestion in moving traffic across the bridge. Finally, the Panzer Lehr Division constructed a bridge using B-type equipment by 1800. But despite the construction of the bridge, a deep abatis and two road craters on the roads to the north and south of the bridge made moving traffic forward after the bridge impossible until the middle 17 December.⁶

The weather initially supported the German assault. First, the planners counted on hard ground and a light frost on 15 December had hardened the soggy ground.⁷ Unfortunately, the ground turned muddy after several days of numerous vehicles traveling on the roads and destroying the dirt roads. This would seriously effect the Germans ability to advance and maneuver forces on the narrow roads. The snowfall on 22 December slowed vehicles and froze roads on hills. Vehicles could not climb the hills and dismounted troops were slowed significantly. The snow also hid Allied minefields

from German units. This also slowed their rate of march as they had to clear roads on the march. Next, ground fog prevented Allied air forces from providing any significant tactical close air support through 18 December. From 19 December until 21 December, the skies were overcast and hindered Allied close air support. The weather broke late on 23 December when the skies cleared. This allowed Allied air to attack German units. The sunshine also melted snow and caused the roads to turn to mud. A heavy snow fell on 28 December froze the roads and ruts but caused the same problems as the snow a week earlier. Fog fell over the Ardennes until 1 January and hampered tactical air support against ground targets in the mornings and evenings. However, isolation of the battle area by allied tactical air support through intense bombings outlined later in the chapter.

The roads in the area quickly turned to mud after being traveled by so many vehicles. Roads across the Sixth Army front were extremely muddy and partially mined. The mine clearing took longer than expected and commitment of vehicles off the road was impossible. By 17 December, units across the Sixth Army were reporting slowed movement due to the bad roads and terrain.⁸ On 18 December, when Field Marshall Model realized that the Sixth Army attack had stalled and that Fifth Army was having success, he directed the transfer of some Sixth Army units to Fifth Army. Problems occurred as these forces were rerouted to the south. Most of these problems were caused by the failure of 116th Volks Grenadier Division to capture St. Vith by 18 December. If St. Vith had been captured, the significant road and rail network could have aided in rapid movement through the area. The Panzer Lehr Division was also delayed by muddy roads enroute to Bastogne. Their planned route was impassable due to bad roads. On 18

December, LXVI Corps advance had slowed dramatically because of road conditions. Mined roads and obstacles also disrupted the time schedule. A critical road from Bulligen to Schoppen was impassable due to the mire and prevented the bringing up of the 2nd SS Panzer Div. An engineer battalion was requested to repair the road but was delayed for twelve hours due to communications and vehicle shortages. By 19 December, I SS Panzer Corps could make no forward advances on the roads due to the impassable conditions. These same conditions would make resupply for them impossible until 20 December. Air supply was requested on 20 Dec but the narrow terrain and Allied air prevented an airdrop.⁹ On 22 December, 2nd SS Panzer Division moved north toward Marche but a cratered road crossing north of Champlon delayed their advance for four hours. On 20 December, 12th SS Panzer Division could not be assembled in the designated area due to bad roads and was unable to accomplish consolidation on the area until 23 December. Many of their vehicles were nonmission capable due to overuse and untrained drivers.¹⁰ The commitment of the 3rd Panzer Division on 20 December was hampered by the abandoned vehicles of the 12th SS Panzer Division on the same route. Once established in the attack, the 3rd Panzer Division established excellent traffic control and had few problems with resupply until 24 December when the weather allowed Allied air to operate. Although supply was effective, the Panzers were continually bogged down in muddy roads.¹¹ By 21 December, Sixth Army began to use every means available, even civilian labor, to repair roads. The vehicles that were committed chewed up the roads and prevented bringing up supplies rapidly. Sixth Army even issued orders to units to get rid of unnecessary vehicles that were not capable of cross-country travel. The 2nd SS Panzer Division was transferred to the Fifth Army to

assist in the attacks on Bastogne but was unable to redeploy because the roads were blocked by both the 116th Volks Grenadier Division and the Fuehrer Escort Brigade. The 9th Panzer Division, from Fifteenth Army, was promised to Sixth Army to enter the fight and breakthrough to an encircled 2nd Panzer Division; however, they were bogged down by muddy roads and American air attacks.¹²

On 24 December, Hitler authorized the release the OKW reserves to Army Group B.¹³ However, these reserves were located far to the rear and were severely lacking fuel and were unable to move. Of these reserves, a battalion of twenty-one new Jagdtigers was dispatched to Sixth Army specifically by Hitler. The Jagdtigers were 128-millimeter guns on a Tiger II chassis weighing about 72 tons. The armor was so thick it was impenetrable to any weapon the Americans had. These were the most powerful tanks on the battlefield. However, they were delayed in transport east of the Rhine and did not arrive until 23 December and had no appreciable effect on the offensive.¹⁴ Additionally, Allied air forces and lack of fuel prevented the movement of these reserves during the day.¹⁵

Roads blocked by debris and obstacles also slowed the advance of the motorized units.¹⁶ Because reconnaissance was unavailable and route information was often inaccurate, the 12th Volks Grenadier Division discovered that an overpass they expected to use had been destroyed. The repair required additional engineers from I SS Panzer Corps. This delayed the 12th Volks Grenadier Division advance for eight hours.¹⁷ Damaged and abandoned German vehicles clogged roads. A shortage of recovery vehicles and long distances to repair facilities prevented removal of vehicles.

By 24 December, the weather had cleared considerably and movements during the day were impossible due to the intensity of Allied air attacks. Sixth Army was thereafter unable to advance forward toward the west.¹⁸ By 27 December, Sixth Army was on the defense and all efforts of an offensive on the northern shoulder were finished.

The Fifth Army had better success in movements but there were still significant mobility problems. On 17 December, the 116th Volks Grenadier Division reached their initial goal, a bridge over the Our River. However, the bridge was insufficient to support tanks and assault vehicles and required fifteen hours of reinforcement by their division engineers.¹⁹ In one case a strong bomber formation dropped numerous bombs on the main road leading south from Houffalize and making it impossible to pass or detour on either side for twenty-four hours.

Vehicles provided for the artillery were ill equipped for the Ardennes. The primary medium-towing vehicle provided was the RSO (Raupenschlepper-Ost). The RSO is a truck chassis with tracks. These were primarily designed for operations in Russia and were sufficient for cold weather. However, they did not have sufficient traction for the snow and ice covered hills of the Eifel region. In the 9th Volks Grenadier Division, 50 percent of the RSOs were left after the start due to NMC conditions. This resulted in the artillery to be towed by those RSO to subsequently be left behind. When the division was committed on 24 December, it took twenty-four hours to move the division due to weather and shortage of vehicles. When they did arrive in their assembly area, the supply vehicles did not arrive and units were without ammunition. Only the battalion without vehicles was able to start movement on 24 December. The delay in movement was especially bad since clear weather allowed for air attacks and melted

snow and heavy traffic turned roads into mud.²⁰ Additionally, the reconnaissance vehicles on wheels or half tracks were insufficient as they could only be used on good roads or suitable terrain.

In review, the inability to provide adequate bridging units and supplies, progressive damage to roads, effects of weather that delayed movements, numerous choke points, insufficient vehicles for the terrain, and interdiction by Allied air caused significant difficulties in German freedom of movement. These difficulties in moving on the battlefield contributed greatly to the failure of many German divisions in not achieving their objectives or failing to achieve success at critical times during the initial days of the Ardennes Offensive.

Section II. Assessment of Fuel the Force

Fuel shortages plagued the offensive from the beginning. Many reasons attributed to the fuel failures. Fuel shortages at the beginning of the offensive and inability to resupply during the offensive were the primary reasons. As covered earlier, the bad weather, poor roads, Allied air, and shortages of vehicles restricted resupply efforts during the offensive.

The most significant factor affecting the fuel problem was that many units started the offensive with less than the promised amount of five basic loads of fuel (an amount that would a vehicle to move 250 kilometers). Most of these units had from one and one-half to two and one-half basic loads on hand (amount that would move a vehicle 75-125 kilometers). The terrain of the Ardennes caused vehicles to use higher gears and the snow reduced the planning factors for fuel consumption by one-half. Some units captured American fuel when possible but not in any appreciable amounts. Fuel was

taken from captured or abandoned American vehicles whenever possible. In the case of Panzer Lehr Division, they captured undamaged, and put to use, some 120 American jeeps and more than 150 other trucks. This would partially make up for the divisions' 70 percent shortage of vehicles.²¹

Sixth Army experienced fuel problems quickly. On the first day of the offensive, the spearhead of the Sixth Army, Kampfgruppe Peiper, was held up fourteen hours by actions at Losheimergraben. This delay while vehicles idled caused KG Peiper to consume much of the fuel faster than expected. This unplanned use of fuel forced KG Peiper to request fuel two days earlier than planned on 17 December. By 21 December, a shortage of fuel prevented the 2nd SS Panzer Division from extending a bridgehead near Tenneville.²² On 23 December, Sixth Army ordered the 2nd SS Panzer Division to redeploy and join the assault on Bastogne but fuel shortages caused significant delays in accomplishing this move. On the same day, the 9th SS Panzer Division was also having trouble exploiting their success due to a lack of fuel.²³

Fifth Army was having similar experiences as Sixth Army. The Fuehrer Escort Brigade (FEB) was committed on 18 December, but the clogged and damaged roads caused by the action around St. Vith slowed their advance. The FEB started with one and a half basic loads of fuel instead of the planned three loads. It took the FEB twelve hours longer than expected to circumvent St. Vith. This additional movement consumed much of the division's fuel. By 19 December, many FEB tanks were unavailable due to fuel shortages. One half of their tanks were out of fuel and had to be towed when they received orders on 25 December to move toward Bastogne. Throughout the campaign,

the FEB lost eighteen tanks to fuel shortage and mechanical failure and seventeen to enemy fire.²⁴

On 18 December, the 116th Volks Grenadier Division's movement was delayed by lack of fuel and obstacles on the roads. By 20 December, their supply vehicles were forced to travel at night and often failed to locate their units or were delayed by heavy traffic. This irregular resupply caused their fuel situation to become very critical. On 24 December, the division finally received some fuel, but it was insufficient to fill the vehicle fuel tanks and delayed operations. Finally, on Christmas Eve, the 2nd Panzer Division, the unit making the farthest westward advance, had completely run out of fuel. Enemy pockets prevented supply trains from providing resupply. On 5 January, Army Group B diverted fuel reserves to Fifth Army because it was in the worst situation.²⁵

Despite the fuel crisis across the front, the nine Panzer units were able to withdraw their remaining Panzers with available fuel.²⁶ The reconnaissance battalion of 2nd Panzer Division and KG Peiper were exceptional cases that outran their supply lines and were cut off from resupply. When these units withdrew from combat, they were forced to abandon their Panzers.

In review, the inability to provide adequate stocks of fuel before the offensive, failure to resupply effectively during the offensive, and interdiction by Allied air caused significant difficulties in German fuel operations. These difficulties in fueling the force contributed greatly to the failure of many German divisions in not achieving their objectives or failing to achieve success at critical times during the initial days of the Ardennes.

Section III. Assessment of Arm the Force

Ammunition would not immediately affect the offensive. Units started the offensive with approximately one to two basic loads of ammunition. The plan was for ammunition to be resupplied during the offensive after second echelon units secured lines of communications. This plan was affected by the inability to move on roads and the staunch defense of the American units. German planners anticipated little resistance from the Americans after the start of the offensive and therefore planned on minimal use of ammunition.

Several problems affected resupply. First, an overall breakdown in the timeliness of reports from the front caused delays in sending resupplies.²⁷ Secondly, the numerous different types of artillery in the units created difficulties in sending the right ammunition to the right unit. A contributor to this problem was the fact that many units were using captured artillery for which there was no resupply of ammunition. Next, security of lines of communications was a hindrance to resupply efforts. The forward units of 2nd Panzer Division and 1st SS Panzer Division could not be resupplied because Americans were in control of the supply routes. These two divisions were the farthest forward units of the German offensive and just outran the ability to resupply themselves. Finally, Allied air interdiction of supply routes made resupply of ammunition possible only during the night. Supply personnel would have trouble finding their units in the confusion and dark. Fortunately for the Germans, some American ammunition was compatible with German equipment. Panzer Lehr was able to capture a large quantity of 105-millimeter ammunition north of St. Hubert on 18 December and another dump at Noville on 20

December. This ammunition was later used against American units in defense of Rochefort.²⁸

It would take several days to show the impact of ammunition shortages. The 212th Volks Grenadier Division suffered shortages of artillery ammunition starting 19 December due to lack of starting loads and inability to resupply across the rivers.²⁹ The 116th Volks Grenadier Division reported a shortage of certain artillery ammunition as early as 23 December.³⁰ The 5th Parachute Division rationed artillery ammunition to seven rounds per day per gun starting 25 December.³¹ LIII Corps' 3 January attack on Dahl was unsuccessful due to a lack of artillery support. There was no ammunition available to the 100 artillery tubes available to the corps.³²

The limited initial supply of ammunition was sufficient for the first days of the offensive but the staunch defense at critical points reduced the amount significantly in some areas. Colonel Werner Boderstein, Chief of Staff, LIII Corps, summed up the artillery ammunition situation, "It often happened that the entire corps had only a few rounds of artillery ammunition at hand during the so fatal days. When one considers that the Americans on the opposite front had fewer pieces of artillery than we had in these battles but could fire more shells that we could was great reason for envy."³³

Section IV. Case Study

The best case in point of logistics affecting one unit was Kampfgruppe Peiper. In the Sixth Panzer Army area, bad terrain and traffic management impeded the assault unit movements. Only the spearhead of the 1st SS Panzer Division, Kampfgruppe Peiper, lead by their regimental commander, COL Joachim Peiper, was making any substantial progress toward the Meuse. The only other unit in the Sixth Panzer Army to encounter

any measurable success was the 9th SS Panzer Division, south of KG Peiper, that assaulted as far as Poteau.

After an initial stall of fourteen hours at the beginning of the assault, KG Peiper moved rapidly on his route from his start point of Losheim to Lanzerath then Bucholtz Station, Malmedy, Bullingen, and Stavelot. At Bullingen, Peiper captured an American airfield. He used American POWs to refuel his tanks with approximately 50,000 gallons of captured fuel. He slowed at Stavelot over the night of 17 December but was able to cross a bridge that had been rigged with explosives. It was later determined that German soldiers, part of "Operation Grief," had removed the explosives. Unknown to COL Peiper, and other German commanders, the largest fuel supply dump on the Western Front was located in Francorchamps--just three miles from Peiper's position in Stavelot. This fuel dump contained 1.2 million gallons of fuel in five-gallon cans. This fuel could have sustained the both the Sixth and Fifth Army's drives to the Meuse.

Once KG Peiper moved through Stavelot, they moved to Trois Ponts where the American 291st Engineer Battalion destroyed the bridges in front of their column. Since KG Peiper had no bridging assets, they were forced to alter their course toward La Gleize. KG Peiper was again low on fuel but was having success in rapid movement. After La Gleize, KG Peiper moved toward Habiemont, where the American 291st Engineer Battalion destroyed another bridge in front of Peiper over Lienne Creek forcing him to return to La Gleize. At La Gleize, a lack of fuel forced Peiper to abandon any offensive actions after 22 December.

In the end, KG Peiper fought fiercely but a shortage of ammunition on 24 December forced COL Peiper to abandon his tanks and retreat back toward German

territory on foot with 800 soldiers. The delays that consumed fuel, the inability to bridge rivers, and maintain momentum most certainly caused his defeat. His ammunition supply was sufficient until the point that he ran out of fuel and had to defend his position. To prove the point of the importance of logistics to KG Peiper, of the tanks from KG Pieper that were captured by Americans later in January, 80 percent were out of gas and fully operational.³⁴

Section V. Assessment of Available Forces

The Wehrmacht's inability to provide sufficient forces greatly influenced the execution of the offensive. The siege of Bastogne is the best example. German divisions of the Fifth Panzer Army, benefiting from better terrain and better roads, quickly moved to and captured St. Vith. The German XLVII Corps quickly moved to their objective of Bastogne and encircled the city. Unfortunately for Germany, these units arrived on 19 December--one day after the American 101st Airborne Division.

Many units committed to the offensive were not reorganized to full strength. The inability of the war industry to deliver the combat vehicles coming off the assembly lines was the major reason for the shortages. The 2nd Panzer Div only had 86 tanks and 20 assault guns in the entire division versus an authorization of 140 tanks and 80 assault guns. The Panzer Lehr Division took only fifty-seven tanks into the offensive. Infantry units were on foot, and artillery was primarily horse drawn. These shortages created problems when trying to mass combat power on the American forces. Destruction of supply trains by Allied air attacks prevented expected Panzer reinforcements for the LXVII Corps Volks Grenadier Divisions on 18 December. The Panzers were intended to

support the 277th and 12th Volks Grenadier Divisions attacks on Monshau since these divisions were insufficiently organized to conduct that type of attack.³⁵

General Manteuffel did not want to capture Bastogne on the initial assault but with reserves in the second wave. When Hitler gave the directive to capture the town immediately, General Manteuffel ordered the town captured. Therefore, a siege of Bastogne started on 21 December. At the height of the siege on Bastogne, the Germans had five infantry divisions and three SS armored divisions surrounding a city defended by only the 101st Airborne Division and one brigade of the 9th and 10th Armored Divisions. Since Hitler was insistent on the capture of Bastogne, he released the OKW reserves to Army Group B on 24 December.³⁶ However, these reserves were located far to the rear and were severely lacking fuel and were unable to move forward fast enough to affect the battle for Bastogne.³⁷ Without the benefit of these additional forces, General Manteuffel moved up forces on 26 December in an attempt to stop the American 4th Armored Division breakthrough to Bastogne. These forces were late in moving to the Bastogne area because they were mostly second echelon units without much of their motorized equipment. Of these newly committed units, the 5th Parachute Division lacked medium towing vehicles, and their artillery was slowly brought up in echelon. The Fuehrer Grenadier Brigade was slowed by movements due to the severe lack of vehicles. Most of the soldiers were on foot or bicycle. Subsequently, it took them four days to arrive in the battle area after they were committed on 19 December. They arrived piecemeal and were committed to the battle likewise. The lateness of these units and their relative combat strength upon arrival allowed the American 4th Armored Division to break through to Bastogne and relieve the siege.³⁸ General Manteuffel continued to attack Bastogne until

2 January when General Patton started his counteroffensive from the Bastogne area. The Fifth Panzer Army never captured Bastogne but did succeed in slowing Patton's advance in the region.³⁹

The only Fifth Panzer Army units to make progress toward their objectives were the reconnaissance elements of the 2nd Panzer Division that reached within two miles of the Meuse River outside Dinant on 24 December. As mentioned earlier, these units ran short of fuel and continued the attack on foot. However, after running low on fuel, ammunition, and suffering from continuing attacks from Allied airplanes, these units became isolated from the remainder of the division. A lack of fuel prevented armored units from supporting these isolated elements or breaking through the American units that were occupying the supply routes. The forward elements were destroyed by units of the British 29th Armored Division and American 2nd Armored Division. On 26 December, the 2nd Panzer Division was ordered to return to Rochefort. Most of the soldiers were able to return on foot leaving all the equipment of the forward units behind.⁴⁰

In review, units in the offensive were insufficiently equipped to accomplish their assigned missions. Shortage of vehicles and improper positioning and employment of forces prevented commanders from applying mass at critical points in the Ardennes Offensive and therefore failing to seize the initiative required for success.

Section VI. Allied Air's Effect on German Tactical Logistics

The final area that sealed the fate of German tactical logistics efforts during the Ardennes Offensive was Allied tactical air attacks. The skies over the Ardennes area did not clear until 24 December. Prior to 24 December, Allied air forces were limited to harassing and deep strikes. On 20 December, only two Allied sorties were launched.

The weather clearing on Christmas Eve allowed the Allied air forces to interdict German supply lines and forces in the field. Allied air forces concentrated on rail, road and logistics centers. Medium bombers and fighters concentrated on isolating the battlefield to prevent German reinforcements and supplies from moving toward the front. Movement of German supply trains was only during the night or during bad weather. No breakout of specific targets hit by Allied air attacks on a day-by-day basis was found, but the final results are rather remarkable. During the day, vehicles were camouflaged to hide them from Allied air. This too caused problems for Germans. Major Denkert, Commander 3rd Panzer Grenadier Division, recalled that his staff was unable to find a resupply column during the day because it was so well hidden.⁴¹ During the period of 16 December to 31 January, the American Eighth Air Force bombers and Ninth Air Force fighters destroyed: 11,378 motor transports, 1,161 tanks and armored vehicles, 507 locomotives, 6,266 railcars, 472 gun positions, and 36 bridges; and cut 974 rail lines and 421 roads.⁴² While these totals cover a period larger than this thesis, the majority of interdiction efforts to isolate the battlefield occurred during the first few weeks after the weather cleared over the battle area. These results are significant when applied to the terrain. The significance of the road and rail cuts and the destruction of the bridges greatly degraded the ability of the German units to maneuver in the battle area and resupply and reinforce their offensive forces.

In review, allied airpower interdicted combat vehicles and supply trains in a close air support role. But the most significant effect was the isolation of the battlefield that prevented resupply from rear supply depots and movement of reinforcements. Allied air superiority provided freedom of maneuver for Allied forces and forced Germans to move

only at night. Allied air was the most significant influence on the failure of tactical logistics during the Ardennes Offensive.

Section VII. Logistics Impact on Supporting Operations

Hitler planned four supporting operations to support the Ardennes Offensive. Logistics had a significant impact on most of these operations in much the same manner as the overall offensive.

On the morning of 17 December, Colonel Karl von der Heyte led "Operation Stoesser," an airborne assault with approximately 1,000 paratroopers into the American rear area to capture bridges and key road junctions north of the Elsenborn Ridge. Many problems caused the operation to fail from the start. Fuel shortages had scrubbed the mission on two previous occasions. A lack of planes forced Colonel von der Heyte to leave service and supply personnel behind at the airfield to advance with ground forces. Wind and pilot error spread airborne troopers over a large area and the paratroopers never assembled in a large enough force to accomplish the mission. Finally, a shortage of radios for the unit was exacerbated after a number of radios were damaged during the airdrop. The lack of communications prevented pockets of soldiers from linking up and fighting as an effective force.⁴³ These problems resulted in "Operation Stoesser" not accomplishing any of their objectives.

Another supporting operation under the command of Colonel Otto Skorzeny, "Operation Grief," was designed to disrupt American rear operations. Logistics would not have an impact on this operation since it was only designed to operate for a small timeframe. This operations was designed around a brigade of Germans who spoke English. These Germans were dressed in American uniforms, put into American

vehicles, and sent behind American lines to disrupt American forces. They changed road signs and redirected American units as they acted as military police at intersections. They did not cause any major problems in the offensive, but their presence was a factor in the way the Americans changed their operations. Everyone was suspected of being a German and challenged. Passwords were no longer adequate and challenges became questions like "Who is Mickey Mouse's girlfriend?" or "Who won the 1939 World Series?" and other similar questions. Elements of Skorzeny's brigade were withdrawn on 25 December.

On 1 January 1945, Hitler launched his remaining Western Front Luftwaffe forces against Allied air bases in Belgium, France, and Holland in "Operation Base Plate." Despite maintenance and fuel problems affected the number of planes that could be used in the attack, the Luftwaffe was able to use 800 planes for the operation. In over two hours, the Luftwaffe damaged several bases and damaged or destroyed 206 Allied planes. However, the Luftwaffe lost over 300 planes and, more importantly, over 250 trained pilots. The attack was unsuccessful in accomplishing the missions assigned. During the attack, Allied air operations continued at all attacked airbases.⁴⁴

The last supporting operation Hitler initiated was "Operation North Wind." The purpose was to prevent the American Third Army from counterattacking toward the Ardennes. Hitler launched this assault with five divisions into the Vosges region toward Alsace on New Years Eve 1944. After three weeks, this weak attack was driven back by the American Sixth Army. "Operation North Wind" did not result in any diversion of any units from the Ardennes region. This operation, with the exception of different

terrain and weather, suffered from many of the same logistical problems concerning fuel and ammunition that plagued the Ardennes Offensive.

In summary, these operations were failures and provided no support to the overall Ardennes Offensive. Logistics influenced each of the operations to various extents but overall these operations were minor and not sufficiently supported from the beginning of the planning.

Section VIII. Final Assessment of Tactical Logistics Failures

On 12 January 1945, the Russian Winter Offensive began that applied pressure on Hitler to move forces from the West to the East. Anticipating an attack in the East, Hitler ordered the withdrawal of the Sixth Army from the Ardennes on 8 January to be transferred to Hungary on the Eastern Front. However, Sixth Army was unable to break contact with advancing American and British forces as quickly as ordered. Eventually it consolidated near Pruem and started to upload on 20 January. The last elements of Sixth Army finally broke contact on 24 January but were delayed by air attacks and meter high snow drifts on the Eifel roads. On 16 January, the American Third and First Army linked up at Houffalize, Belgium, and effectively cut the salient. The majority of German troops were able to escape before the Allied pincers clamped across the bulge on 16 January.

¹Heinrich Luettwitz, "Commitment of the XXXVII Panzer Corps in the Ardennes 1944-1945" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS A-939, date unknown), 4, photocopied.

²Fritz Kraemer, "Commitment of the 6th Panzer Army" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS A-924, October 1945), 26-40, photocopied.

³Franz Sensfuss, "Commitment of the 212th VGD in the Ardennes Offensive" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS A-930, April 1946), 4, photocopied.

⁴Franz Sensfuss, "212th VGD in the Ardennes Offensive (16 December--25 January)" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS A-931, May 1946), 8, photocopied

⁵Erich Brandenburger, "Questions and Answers on the Ardennes Campaign and Later Operations of 19 Army" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS A-934, December 1945), 3, photocopied

⁶Hasso Manteuffel, "Fifth Panzer Army (Ardennes Offensive)" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS B-311, September 1946), 2, photocopied.

⁷Col Reichhelm, "Report on Activity" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS A-925, 1945), 22, photocopied

⁸Kraemer, 31.

⁹Ibid., 32.

¹⁰Ibid., 34.

¹¹Walter Denkert, "Commitment of the 3rd Panzer Grenadier Division in the Ardennes Offensive" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS A-978, date unknown), 1-2, photocopied.

¹²Kraemer, 39.

¹³Ibid., 39.

¹⁴Herbert Buechs, "The Ardennes Offensive" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, ETHINT-34, August 1945), 12-13.

¹⁵Hasso Manteuffel, "Fifth Panzer Army" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, ETHINT-46, October 1945), 7.

¹⁶Luettwitz, 5.

¹⁷Kraemer, 27.

¹⁸Ibid., 52.

¹⁹Siegfried Waldenburg, "Commitment of the 116th Panzer Division in the Ardennes" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS A-873, December 1945), 8, photocopied.

²⁰Werner Kolb, "The Ardennes Offensive in the Sector of the 9th Volks Grenadier Division 925 (December 1944--25 January 1945)" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS A-521, December 1945), 9.

²¹Fritz Bayerlein, "Role of the Panzer Lehr Division in the Ardennes Offensive" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS A-941, September 1945), 7, photocopied.

²²Luettwitz, 9.

²³Kraemer, 48.

²⁴Otto Remer, "Fuehrer Begleit (Escort) Brigade in the Ardennes" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, ETHINT-80, August 1945), 14 photocopied.

²⁵Siegfried Waldenburg, "Commitment of the 116th Panzer Division in the Ardennes" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS A-873, December 1945), 8, photocopied.

²⁶Alfred Jodl, "Ardennes Offensive" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, ETHINT-51, July 1945), 20, photocopied.

²⁷Alfred Jodl, "Ardennes Offensive" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS A-873, December 1945), 8, photocopied.

²⁸Fritz Bayerlein, "Role of the Panzer Lehr Division in the Ardennes Offensive" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS A-941, September 1945), 7, photocopied.

²⁹Sensfuss, "212th VGD in the Ardennes Offensive," 8.

³⁰Waldenburg, 22.

³¹Ludwig Heilmann, "5th Parachute Division in the Ardennes Offensive" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS B-023, date unknown), 41, photocopied.

³²Werner Boderstein, "LXXX Corps (1 December 1944--22 January 1945)" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS B-032, date unknown), 10, photocopied.

³³Boderstein, 14.

³⁴Joachim Peiper, "Kampfgruppe Peiper (15–26 December 1944)" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS C-004, date unknown), 5-16, photocopied.

³⁵Otto Hitzfeld, "Ardennes Offensive" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS A-936, 1953), 7, photocopied.

³⁶Kraemer, 52.

³⁷Manteuffel, (B-151a), 7.

³⁸Boderstein, 3-6.

³⁹Goolrick and Tanner, 185.

⁴⁰Cole, 298.

⁴¹Denkert, 1.

⁴²Wesley Craven and James Cate, eds., *The Army Air Forces in World War II* (Chicago: University of Chicago Press, 1957), 711.

⁴³Karl von der Heydte, "German Paratroopers in the Ardennes" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, ETHINT-75, October 45), 1, photocopied.

⁴⁴Goolrick and Tanner, 98.

CHAPTER 4

FINAL ANALYSIS AND CONCLUSION

Hitler's orders of 8 January to withdraw the Sixth Army from the Ardennes to the Eastern Front began the end of the offensive in the Ardennes Forest. On that same date, Hitler also stopped all priority of supplies and reinforcements to Army Group B. Thereafter, the Fifth Army and the Seventh Army began a fighting withdrawal toward the West Wall to prevent the Americans and British from entering Germany. By 28 January, the Allies had pushed the Germans back to the original positions of 16 December 1944. From 28 January until 8 May, German forces could only mount a staunch defense of German territory. The Ardennes Offensive was the last major offensive the German Army would attempt on the Western Front.

While the Allied victory in the Ardennes was not as significant to the outcome of the war as the Normandy landings or the Battle of Britain, it did have a significant impact on the war. Most significantly, the Ardennes Offensive consumed the final reserves of manpower and equipment that Germany could muster. The measures taken by the Wehrmacht to support the Ardennes Offensive dramatically affected the other fronts. The drastic rationing of ammunition and fuel to units on the Eastern and Italian fronts severely hampered their ability to hold defensive positions. Russian forces continued their advance in Poland, Hungary, and Rumania; and Americans and British were moving into the Italian Alps. Finally, the natural resources used to provide the required material for the Ardennes Offensive virtually consumed the last remaining reserves in Germany.

While no single factor determined the outcome, logistics had the largest influence in the failure of the offensive. There were several areas that logistics affected that caused

the German defeat in the snowy Ardennes Forest. These factors were the poor strategic condition of the German war industry, improper planning, and execution of the buildup and stockage of supplies for units prior to the start of the Ardennes Offensive, and the influence of Allied air forces on the Germans ability to sustain the offensive.

In retrospect, the outcome of the Ardennes Offensive was determined in early 1944 when the Allies refocused "Operation Point Blank"--the strategic air campaign against the German war industry. The Allied air campaign had the most direct and indirect influence on the ability of the German war industry to support and sustain the offensive. The air campaign started slowly to degrade an already strained war economy and caused Germany to reach into her strategic reserves. Air attacks affected several industries, but the predominant reductions were in oil production. The effects of the Allied air campaign against oil facilities and the loss of oil fields in Rumania resulted in caution on the part of Hitler to protect the last remaining reserves of fuel. This caution kept fuel vital to the Ardennes Offensive positioned east of the Rhine. Allied tactical air interdiction during the Ardennes Offensive prevented any meaningful amounts of these reserves from reaching thirsty tanks in the Ardennes. The necessity to conserve fuel during the buildup prevented many units from using vehicles and therefore conducted the assault on foot or using horse transport. Many units had to take vehicles or fuel from their artillery to move maneuver units. This forced these units to abandon their artillery after the start of the offensive and thereby removing any direct fire support. The final area affecting the war economy was the loss of required raw materials to support the war effort. Despite the losses and high productive output of the German war economy, the

loss of oil from Rumania and Hungary and the loss of metals used to make ammunition were sufficient to shake the wobbly legs of the operation.

The next logistics factor that affected the outcome was Hitler's inability to provide sufficient forces to accomplish an unrealistic goal. Field Marshall Rundstedt believed the plan was far too ambitious for the available forces, ammunition, and fuel. Furthermore, he believed there were insufficient forces to form effective second and third echelon forces needed to consolidate the attack and to secure the flanks.¹ Although Germany had superior numbers of divisions, personnel, and tanks, many of these units provided for the offensive were ill prepared for offensive operations. The majority of these units were undermanned and under equipped to accomplish their missions. Instead of bringing existing units to their full strength, Germany created new units that were poorly trained and equipped. The fuel shortage was the biggest factor in reorganization of units. Motorized units were organized with bicycles while artillery unit relied heavily on horse transport. A lack of fuel was the reason many armored units could not properly train for driving in this type of terrain. The shortage of fuel resulted in the use of only part of the artillery and rocket projector brigades participating in the offensive. Furthermore, the Seventh Army, without much of its motorized equipment due to a lack of fuel, could not move as far nor as fast as needed. This would prove fatal since many of these "demotorized" units were on the southern shoulder and were unable to prevent General Patton's Third Army from penetrating the German salient and relieving Bastogne. Finally, Army Group B received eight less infantry divisions than planned. These units could have been used to secure roads or attack pockets of resistance.

However, without these units, Army Group B was without sufficient forces to secure the flanks of the salient.

The buildup of forces also contributed to the failure of the offensive. The buildup of troops and supplies occurred over the span of one and one-half months. During this time, over 10,000 railcars of troops, equipment, and supplies were loaded, moved, and unloaded in the Ardennes. The speed with which the move occurred and the secrecy that shrouded the movement caused problems in getting the right troops with the right equipment to the same place with the right supplies. The delays were caused by Allied air attacks on rail centers, fuel shortages, and congestion of the rail network. These delays caused problems in training for many of the new units. These untrained units then went into the offensive unprepared for combined arms fighting. The fact that one unit marched from Finland is an indication of the difficulties faced by the Wehrmacht to provide forces.

Finally, the German's inability to sustain the offensive put the final nail in the coffin of the offensive. Several factors inhibited the German's ability to support their combat operations. First, the terrain and weather did not permit the rapid movement that Hitler required for success. The unfavorable terrain choked movements, canalized the attack, congested traffic, and bogged down the advance. These factors caused the Germans to lose the effects of surprise they had achieved on 16 December. The muddy roads, snow, and cold conditions primarily affected the vehicle's rate of advance. A severe shortage of vehicles capable of operating in the steep grades and snow also affected the ability to move in the Ardennes. The lack of bridging equipment further slowed the advance of units as they tried to negotiate the numerous rivers and streams in

the area and even forced some units to advance without tank and artillery support. Next, Allied air tactical attacks severely inhibited day movements after 24 December when the weather cleared. Allied air attacked German armored vehicles when possible, but primarily concentrated their attacks on railways and transportation centers to cut the tail of the German thrust. These focused air attacks crippled an already damaged regional transportation net, which in turn weakened an already stretched and weak supply system. The weakened transportation network and the location of main supply depots east of the Rhine resulted in resupply efforts taking several days.² Although OB West possessed sufficient ammunition and fuel for the offensive, the inability to move freely around the build up area and the strict secrecy of the plan affected the ability to plan and properly position ammunition stocks. This resulted in insufficient fuel and ammunition being provided to units before the offensive. Furthermore, during the offensive, Allied air attacks would effectively isolate the battlefield and prevented German units from receiving adequate supplies of ammunition and fuel. The Fifth Panzer Army accomplished the deepest penetration, but their poor second echelon units were unable to maintain supply lines to rear supply depots. Lieutenant General Manteuffel stated that only thirty-five tanks of his Fifth Panzer Army were lost to enemy fire while the loss of tanks due to a shortage of fuel and recovery vehicles were three times larger.³ The offensive main effort, the Sixth Panzer Army lost 25 to 30 percent of their ammunition and fuel supply trucks to Allied air attacks.⁴ Furthermore, an unexpected staunch defense by American and British units forced Germans artillery to consume twice the projected amounts of ammunition and the supply system was unable to continue to sustain this rate of resupply.

The offensive in the Ardennes cost Germany over 100,000 soldiers killed, wounded, or missing and 26,000 captured. The Luftwaffe in the west, virtually ineffective during the offensive, was all but destroyed and could only provide nuisance attacks on Allied forces until the end of the war. The Luftwaffe lost nearly 800 aircraft from 16 December to 28 January. This was 10 percent of the total available to the entire Luftwaffe. Most of the ground units committed to the offensive were decimated. The once mighty Panzer Lehr Division began in December with 3,000 soldiers and 104 tanks. In late January, it crawled back across the West Wall with sixteen tanks and 400 soldiers. The pride of Hitler's Sixth Panzer Army, the 1st SS Panzer Division, began movement out of the Ardennes on 9 January with only six combat ready tanks. Most of the combat vehicles left behind were lost due to mechanical failure, lack of tank retrievers, or lack of fuel. All totaled, Germany lost approximately 50 percent of the armored vehicles committed in the Ardennes offensive. Many other divisions ceased to exist as divisions: 560th Volkjs Grenadier Division, 26th Volks Grenadier Division, 5th Parachute Division, and the 326th Volks Grenadier Division.⁵ Germany's ammunition stocks were reduced to only one-third of the requirements to support the entire war effort, while the Western Front was left with no appreciable fuel reserves.⁶

Germany commanders from the Chief of the Wehrmacht down to division commanders attribute the defeat in the Ardennes in large part to logistics. Lieutenant General Jodl and Field Marshal Keitel state the causes for failure were soft roads that prevented rapid movement of armored units, inadequate training during the buildup, and widespread shortage of tracked transport vehicles.⁷ Field Marshall Rundstedt identified the improper grouping and insufficient number of divisions, inadequate supplies of fuel,

unsatisfactory transportation assets, and the effects of Allied air attacks in the German rear areas as the key factors in determining the outcome of the offensive.⁸ Lieutenant General Manteuffel acknowledges the inability to move freely during the assault caused by Allied air superiority, the significant lack of fuel, and terrain that was not conducive to tank warfare as contributing to the failure of his Fifth Panzer army.⁹ General Dietrich believed the improper planning, lack of fuel and supplies, lack of training, and the terrain for that time of year were the main failures.¹⁰ Major General Fritz Kraemer, Chief of Staff, Sixth Panzer Army, blames the effects and difficulties of the terrain and the confusion caused by Allied air forces as the reasons for failures in German ammunition and fuel resupply.¹¹ Lieutenant General Brandenberger primarily credits the inadequate forces, Allied air superiority, inadequate supplies of fuel and ammunition, and inadequate motor transport as the reasons he was unable to overcome weather and terrain difficulties.¹² Lieutenant General Kneiss, Commander LXXXV Corps of Seventh Army, attributes his failures to the basic weaknesses of the forces, insufficient ammunition and fuel, a lack of air support, and losses of transportation assets.¹³ Lieutenant General Luettwitz, commander of the XLVII Panzer Corps, identified the lack of fuel, terrain that was unsuitable for armored units, and the Allied air force preventing German freedom of maneuver in the battle area.¹⁴ Colonel Bodenstein, Chief of Staff LIII Corps, identifies the insufficient forces, poor state of training caused by the hasty formation, and the supply situation.¹⁵ Colonel Peiper, when asked what he would do differently if he had to plan the offensive again, stated that he would: implement a speedier supply system for fuel, place a bridging column with each armored unit, and keep horse-drawn artillery in the rear of columns to keep them from clogging roads.¹⁶

Therefore after a thorough analysis of the drastic strategic political and military situations, the inability of the German war industry to provide supplies to conduct the offensive, and the influence of Allied air operations on operational and tactical logistics during the offensive, it is apparent that the German logistic system failed and doomed the offensive.

What was the final cost of the Ardennes Campaign? The Germans gained a six to eight week delay from American and British attacks on the Rhine area at the cost of her strategic reserves of men and equipment. The Ardennes Offensive was a strategic, operational, and tactical failure. It failed to meet any of the objectives Hitler set as required for success. Hitler gambled--and lost.

¹FM Rundstedt, LTG Manteuffel, LTG Blumentritt, and LTG Kruse, "The Ardennes Offensive" (location unknown, August 1945), 26, photocopied from Center of Military History.

²Hermann Priess, "Commitment of the I SS Panzer Corps during the Ardennes Offensive (16 December 1944–25 January 1945)" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS A-877, March 1946), 61, photocopied.

³Rundstedt et al., "The Ardennes Offensive," 27.

⁴Sepp Dietrich, "Sixth Panzer Army in the Ardennes Offensive" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, ETHINT-15, August 1945), 25, photocopied.

⁵Danny S. Parker, *Battle of the Bulge Hitler's Ardennes Offensive, 1944-1945* (Philadelphia: Combined Books, 1991), 293.

⁶Center of Military History, Department of the Army, Center of Military History Publication 70-7, *Command Decisions* (Washington, DC: Government Printing Office, 1960), 459.

⁷Keitel Wilhelm and Alfred Jodl, "The German Counter-Offensive in the Ardennes December 1944-January 1945: A Study of the Initial Phases" (Directorate of

Tactical Investigation, War Office, date unknown), 52, photocopied from Combined Arms Research Library, Ft. Leavenworth, KS, Reference Number N13205.

⁸Gerd von Rundstedt, "The Ardennes Offensive" (Historical Division, Headquarters US Army Europe, Foreign Military Studies Branch, ETHINT-47, August 1945), 12-13, photocopied.

⁹Hasso von Manteuffel, "Fifth Panzer Army (11 September 1944-January 1945)" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, ETHINT-45, June 1945), 9, photocopied.

¹⁰Sepp Dietrich, "Sixth Panzer Army in the Ardennes Offensive" (Historical Division, Headquarters US Army Europe, Foreign Military Studies Branch, ETHINT-15, August 1945), 22, photocopied.

¹¹Fritz Kraemer, "Sixth Panzer Army (16 November 1944-4 January 1945)" (Historical Division, Headquarters US Army Europe, Foreign Military Studies Branch, ETHINT-21, August 1945), 17, photocopied.

¹²Erich Brandenburger, "Seventh Army in the Ardennes Offensive" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS A-876, January 1951), 97, photocopied.

¹³Baptist Kneiss, "LXXV Infantry Corps (November--26 December 1944)" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, ETHINT-40, August 1945), 4, photocopied.

¹⁴Heinrich von Luettwitz, "XLVII Panzer Corps in the Ardennes" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS A-938, October 1945), 3, photocopied.

¹⁵Werner Boderstein, "LIII Corps (1 December 1944--22 January 1945)" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS B-032, date unknown), 17, photocopied.

¹⁶Joachim Peiper, "1 SS Panzer Regiment (11-24 December 1944)" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, ETHINT-10, September 1945), 24, photocopied.

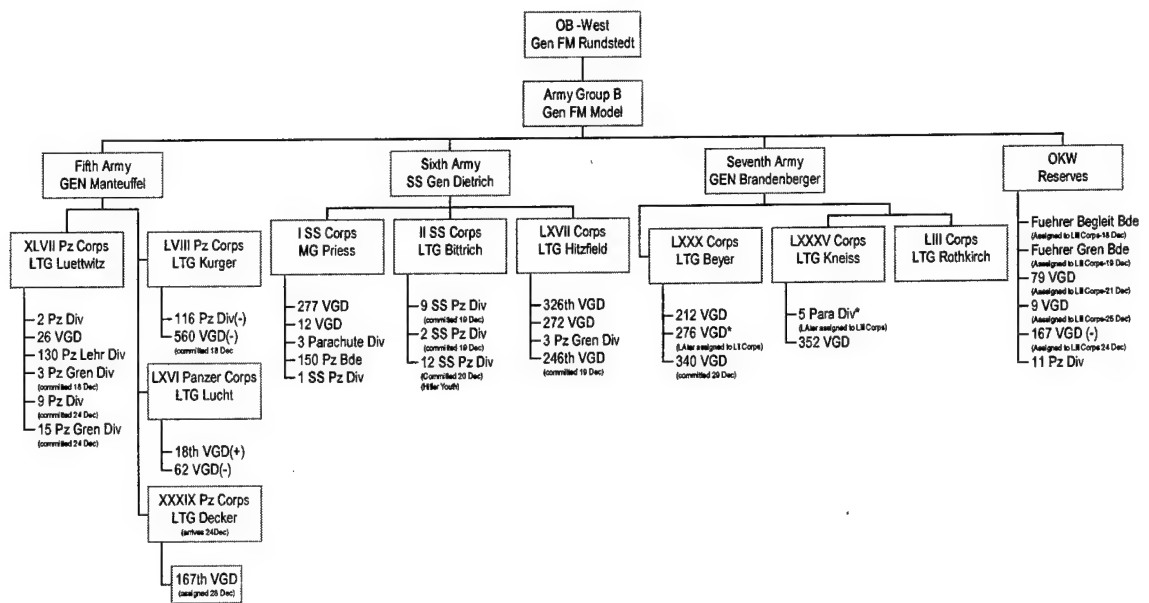


Figure 1. German Order of Battle. Compiled from numerous sources: Depuy, Cole, Parker, ETHINT Series.

APPENDIX A

LIST OF RAW MATERIAL SOURCES

Table 1. Raw Materials provided by other nations
and their use in war materials.

Raw Material	Country	Use
Aluminum	Hungary	Aircraft
Chromium	Bulgaria, Greece	Steel Production
Nickel	Finland, Norway	Ammunition
Copper	Finland, Norway, Yugoslavia	Ammunition Casings
High Grade Iron Ore	Sweden	Steel Production
Manganese Ore	Russia	Steel Production
Oil	Rumania, Hungary	Fuel and POL
Bauxite	France, Yugoslavia	Steel Production

Source: Charles V. von Luetichau, "The Ardennes Offensive, Germany's Situation in the Fall of 1944, Part Two: The Economic Situation" (Washington, DC: Office of the Center of Military History, 1953), 49.

APPENDIX B

REORGANIZATION INFORMATION

Table 2. Reorganization of Panzer Divisions for Ardennes Offensive

Type of Reorganization	Unit	Allocation of Panzers
Total	1, 2, 9, 12 SS Panzer Divs	100%
Preferential	2 Panzer Div Panzer Lehr Div	80% 70%
Limited	3 and 15 Panzer Gren Divs 10 SS Panzer Div, 9 and 21 Panzer Div	60-70%

Table 3. Planned vs. Available Forces for the Ardennes Offensive

	Draft of 11 Oct	Employed on 6 Dec and in reserve	Added during Offensive	Not at all or not sufficiently reorganized
Panzer Div	10	7	1	3
Panzer Brigade	-	2	-	-
Panzer Gren Div	4	-	2	2
Inf and VG Divs	16	13	1	3
Fallschirm Div	<u>2</u>	<u>2</u>	-	<u>1</u>
Full Divisions	32	24	4	9

Table 4. Allocation of Divisions at Start of Offensive

	Draft of 11 Oct	Employed on 16 Dec & in reserve	Added during Offensive	Total
5th Panzer Army	7 (4)	8 (4)	4 (3)	12 (7)
6th Panzer Army	9 (4)	9 (4)	-	9 (4)
7th Panzer Army	7 (1)	4 (-)	-	4 (1)
Reserves	6-7 (3)	3 (1)	-	3 (1)
Total	29-30 (12)	24 (9)	4 (3)	28 (13)

Note 1: The number in () indicates the number of Panzer Divisions within the total.

Source: Percy Schramm, "The Preparations for the German Offensive in the Ardennes (September 16-December 1944)" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS A-862, date unknown), 113-114, photocopied.

APPENDIX C

TIME LINE FOR MOVEMENT OF UNITS INTO THE ARDENNES AREA

Table 5. Time Line

<u>Assigned Army</u>	<u>Unit</u>	<u>Date of Detraining</u>	<u>No. of Trains</u>
5	18 Volks Grenadier Division	28 Oct	26
5	26 Volks Grenadier Division	2-12 Nov	35
7	212 Volks Grenadier Division	7-13 Nov	35
6	1 SS Panzer Division	10-15 Nov	70
6	277 Volks Grenadier Division	13-15 Nov	35
5	Panzer Lehr Division	14-24 Nov	70
7	352 Volks Grenadier Division	15-24 Nov	35
6	9 Ss Panzer Division	21 Nov	70
6	12 SS Panzer Division	20 Nov	70
6	3 Para Division	27 Nov	25
7	276 Volks Grenadier Division	18 Nov--1 Dec	35
5	2 SS Panzer Division	End of Nov	70
OKW Res	Fuehrer Escort Bde	1-3 Dec	25
6	12 Volks Grenadier Division	29 Nov--3 Dec	35
6	326 Volks Grenadier Division	2-10 Dec	35
5	560 Volks Grenadier Division	7-10 Dec	35
7	5 Para Division	6-20 Dec	25
5	116 Panzer Division	5-12 Div	50
5	Panzer Lehr Division ⁱ	10 Dec	15
6	150 Panzer Bde	12-13 Dec	20
OKW Res	79 Volks Grenadier Division	15-19 Dec	35
OKW Res	Fuehrer Gren Bde	17-18 Dec	20
OKW Res	9 Volks Grenadier Division	18-25 Dec	35
	167 Volks Grenadier Division ⁱⁱ	22 Dec	35

Note i: Panzer Lehr conducted two separate moves. This one very little by rail.

Note ii: 167 Volks Grenadier Division was designated for the offensive but was diverted to A Grp G

Note iii: 62 Volks Grenadier Division, 340 Volks Grenadier Division, 272 Volks Grenadier Division and 2 Panzer Div were already in the area.

Source: William Keitel, "The German Counter-Offensive in the Ardennes--A Study of the Initial Phases" (Directorate of Tactical Investigation, War Office, date unknown, Combined Arms Research Office reference number N13205), 3, photocopied

APPENDIX D

EVALUATION OF THE UNITS ATTACHED TO THE SEVENTH ARMY

- 5th Parachute Division--Newly Organized Division. Composed of members of the airforce. Officers at all levels had no training and little combat experience. Composed of three regiments of two battalions each, one artillery regiment, 1 antiaircraft company, one assault gun battalion with 30 assault guns, one engineer battalion, one antitank regiment, one motor battalion, one advance detachment. The division maintained only weak rear services therefore making the bringing up of supplies very difficult. The two replacement training battalions of 1000 men each were immobile due to the lack of vehicles. General Evaluation: Limited fighting qualities due to defective training, unqualified commanders and limited mobility.
- 352nd Volks Grenadier Division--Newly organized with small cadre of experienced subordinate commanders and personnel. Not sufficiently trained. Approximately 13,000 men with assault gun company with fourteen Model 38t tanks. General Evaluation: Good division but lacked sufficient equipment.
- 276th Volks Grenadier Division--Newly organized with mostly unqualified commanders and subordinate commanders. Organization same as 352 VGD above but with additional assault gun company provided during the last days of the operation. General Evaluation: Division was a deception and was no longer fit for modern large-scale operations.
- 212th Volks Grenadier Division--Newly organized division with some fighting experience. Division had good commanders and for the most part good subordinate commanders. Composed the same as 276 VGD above but with only five available assault guns available to start the offensive. General Evaluation: Good division with good fighting spirit and command.
- 9th Volks Grenadier Division--Newly organized division with good cadre and qualified commanders. The division's morale suffered from the scattered commitment of units. Composed the same as 352 VGD above. General Evaluation: Good division which would have been more successful if committed completely.
- 78th Volks Grenadier Division--Newly organized from parts of other units. Morale problems and unqualified commanders. Composed the same as 276 VGD above. General Evaluation: Some parts fought better than others did and the division was generally ineffective as a whole.

Fuehrer Grenadier Brigade--Reorganized with equipment and experienced personnel.

Commanders and subordinate commanders were not up to the task. Composed of one armored personnel carrier battalion, one infantry battalion on foot, one armored battalion of forty Model V tanks, one armored engineer company, one antitank company, one antiaircraft battalion, one replacement training battalion.

General Evaluation: The fighting quality of this well equipped and well composed unit suffered from the scattered commitment caused by bad direction and unequal mobility of the different parts.

Volks Artillery Corps Nos. 406 and 407--Both formations were good but their commitment suffered from continual shortages of ammunition.

Volks Werfer Brigade No. 7 and 9--same evaluation as Volks Artillery Corps above.

Assault Gun Brigades (2 each)--Training, direction, and cooperation were defective because they were two rapidly organized.

Engineer Brigade--Composed of two battalions and one engineer columns. Good direction and fighting qualities but almost no training in bridge construction.

General Comments:

1. 12 light machineguns per company
2. 12 heavy machineguns per heavy company
3. No shortage of Infantry ammunition
4. Approximately 30 Panzerfaust per company
5. Each heavy company had six medium (80 mm) mortars and every 13th company had additional four heavy (120 mm) mortars. Significant shortage of 120-millimeter ammunition.

Source: General Rudolf Gernsdorf, "Evaluation and Equipment of Units Attached to 7th Army in the Ardennes Offensive" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS A-932, date unknown).

APPENDIX E

CAPABILITIES OF GERMAN BRIDGING UNITS

<u>Type</u>	<u>Length</u>	<u>Capacity</u>
Bridge Column	25 meters	up to 16 tons
Engineer Column	50 meters	up to 70 tons
Large Ferries		up to 70 tons
Motor Transport Column	55 meters	up to Panzer IV weight
Bridging Equipment--B (three subtypes)		
Pontoon Bridge	430 foot	4.5 tons
Bridge	250 foot	10 ton
Bridge	170 foot	20 ton
Bridging Equipment--J	Box-trestle types with pontoons or trestles which could carry loads up to tanks or light rail cars.	

Note 1: Each mechanized or motorized division had a Bridging Equipment B unit of some model. Each infantry type regiment contained one combat engineer company.

Note 2: Total of fourteen Equipment B types and eight Equipment J types within Army Group B.

Note 3: Engineer troops not within the engineer battalions were not from the Engineer Corps but were troops of the same branch their unit supported but were trained in some engineer support tasks.

Sources: Hasso von Manteuffel, "Fifth Panzer Army (Ardennes Offensive)" (Historical Division, Headquarters, US Army Europe, Foreign Military Studies Branch, MS B-151a, 1953), 6-7; and Trevor Dupuy, *Hitlers Last Gamble* (New York: Harpers Publishing, 1994), 421.

APPENDIX F

WEATHER AND ALLIED BATTLEFIELD AIR DURING ARDENNES OFFENSIVE

Date	Weather	Allied Air Sorties
16 December	Overcast	359*
17 December	Fog	1053**
18 December	Fog	519
19 December	Overcast	196
20 December	Overcast	2
21 December	Overcast	100
22 December	Snow	94
23 December	Fog/Clear	619***
24 December	Clear	1138
25 December	Clear	1066****
26 December	Clear	937
27 December	Clear	1294
28 December	Heavy Snow	23
29 December	Fog	460
30 December	Fog	690
31 December	Fog	700
1 January	Clear	1000

Source: Danny Parker, *Battle of the Bulge Hitler's Ardennes Offensive, 1944-1945* (Philadelphia: Combined Books, 1991), 292.

GLOSSARY

Panzer	German tank of any model
Panzergrenadier	Infantryman that accompanies tanks or a unit of these personnel

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LTC Billy Jordan
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